

Mica Deposits of the Southeastern Piedmont

Part 7. Hartwell District, Georgia and
South Carolina

Part 8. Outlying Deposits in South Carolina

GEOLOGICAL SURVEY PROFESSIONAL PAPER 248-E



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By WALLACE R. GRIFFITTS *and* JERRY C. OLSON

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*Distribution and structure of pegmatite
bodies in the areas, their mineralogical
characteristics, and the economic possibilities
of the mica and other pegmatite minerals*



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MICA DEPOSITS OF THE SOUTHEASTERN PIEDMONT

PART 7. HARTWELL DISTRICT, GEORGIA AND SOUTH CAROLINA

By WALLACE R. GRIFFITTS

ABSTRACT

Eight mica mines were mapped and 17 others examined in the Hartwell district of Georgia and South Carolina in 1943, 1944, and 1945. The area is in a gently rolling part of the Piedmont that ranges from 498 to 850 ft in altitude. The rocks, which are deeply weathered, are predominantly mica schist and gneiss with small amounts of hornblende gneiss. A large granite body extends into the district from the south but underlies only a small area near the pegmatites. The regional trend of the rock units, as well as the foliation of the metamorphic rocks, is northeast, and the regional dip is southeast.

Sills and dikes of pegmatite are scattered unevenly through a belt 28 miles long and 2 to 10 miles wide. Most of the pegmatite bodies are in groups near Airline and Montevideo, Ga. They range from 3 to 25 ft in maximum thickness and 200 to 900 ft in length. The dikes near Montevideo are larger than those elsewhere in the district.

The deposits in the Montevideo area are zoned and contain quartz cores, perthite-rich intermediate zones, and plagioclase-rich wall zones. In the Airline area and in outlying parts of Hart County, the pegmatites vary widely in internal structure. Many are unzoned, but others are zoned and have quartz cores and plagioclase-rich wall zones with or without mica-rich intermediate zones. Perthite is rare in these pegmatites near Airline.

Plagioclase, perthite, quartz, muscovite, and biotite are the common pegmatite minerals; tourmaline, beryl, and garnet are the known accessories. The crystallization of the pegmatite in both areas began with the formation of plagioclase and quartz. This was followed in many deposits by the crystallization of potash feldspar or mica and, finally, by the formation of quartz.

The mica obtained in the Hartwell district generally yields only small sheets; some is lightly specked, and a little is heavily stained. Between June 1942 and January 1945, a total of 5,702 lb of sheet was sold.

INTRODUCTION: FIELD WORK AND ACKNOWLEDGMENTS

Detailed investigations of mica deposits in the Hartwell district included about 5 days of field work by J. C. Olson in 1943 and 1944 and 2 weeks by W. R. Griffiths in 1944 and 1945. Eight mines were mapped, and 17 other mines and prospects were examined. Information concerning 35 additional prospects was obtained from file reports of the Colonial Mica Corpora-

tion, and descriptions of still others have been abstracted from the published record (Furcron and Teague, 1943, pp. 160-171; Sterrett, 1923, pp. 75, 77-78, 282-286).

Clyde S. Burleson, D. J. Smith, and S. K. Greene, of the Colonial Mica Corporation, furnished helpful information about many deposits and assisted in the examination of several. Mine operators and local residents were uniformly cooperative throughout the investigations.

GEOGRAPHY OF THE DISTRICT

The district, which extends 28 miles eastward from a point 4 miles west of Airline, Ga., to a point 4 miles east of Iva, S. C., includes parts of Hart and Elbert Counties in Georgia and Anderson and Abbeville Counties in South Carolina. It embraces an area of about 250 sq. mi., with the town of Hartwell, Ga., near its center.

All parts of the district are accessible over a network of State and county roads, few of which are hard-surfaced. Nearly all deposits are less than a mile from the nearest maintained public road. The town of Elberton, which is about 5 miles south of the district, is served by the Seaboard Airline Railway and by a branch line of the Southern Railway which extends northwestward through Royston and Bowersville, 3 to 5 miles west of the district. The Hartwell Railway, which connects with the Southern at Bowersville, extends through the west half of the district.

The area is in a gently rolling part of the Piedmont province. It is drained by tributaries of the Savannah River, which flows southeastward through its eastern part. The lowest point, which is on the river near the Martin mine, is 498 ft. above sea level, and the altitude of the highest point, near Airline, is approximately 850 ft. The maximum local relief is about 60 ft. Weathering of the bedrock is thorough in most places, and outcrops are rare.

GEOLOGY OF THE DISTRICT

ROCK FORMATIONS

METAMORPHIC ROCKS

Most of the district is underlain by mica schist and gneiss. Mica, either muscovite or biotite, is the chief constituent, but quartz and feldspar are present in moderate to large quantities. Sillimanite is widely distributed as a minor constituent and locally is very abundant. At the Waterhole and H. and P. mines, float blocks as much as 4 in. thick and 14 in. long consist chiefly of sillimanite, with a little mica and magnetite or ilmenite. Layers of hornblende gneiss that are a few inches to several feet thick are exposed in the terrane south of Hartwell. Other layers of a black, fine-grained feldspathic rock also were observed, but their exact nature was not determined. Work in 1950 by the Georgia Geological Survey has indicated that sillimanite is common in eastern Hart County, whereas staurolite not associated with sillimanite occurs in the western part of the county, indicating a decrease in intensity of metamorphism toward the west, away from the Savannah River.

IGNEOUS ROCKS

The south-central third of Elbert County and several square miles of southwestern Hart County are shown on the State geologic map (Stose and Smith, 1939) to be underlain by a muscovite-biotite granite. A similar but somewhat porphyritic granite is exposed along the Savannah River in the area underlain by sillimanitic schists. Both granites are considered to be of late Paleozoic age. Light-tan soil in a small area near the Bio road and about 4 miles south of Hartwell probably was derived from an underlying body of granite. Granite sills 1 to 7 ft thick are exposed elsewhere in Hart County but appear to be rare.

Excellent exposures of granite are provided by several quarries in and near Elberton. The unweathered gray rock consists chiefly of feldspar, with quartz and subordinate biotite. It is uniformly fine grained except for widely scattered feldspar crystals as much as a third of an inch across. The biotite flakes, which are evenly distributed, are oriented to produce a distinct foliation. The granite walls of the quarries are marked by few fractures below a near-surface zone of sheeted and weathered material.

STRUCTURE

The regional trend of the rock units, as shown on the State geologic map, is northeast. In the Airline area the few exposures in road cuts and mine workings indicate that the layering and foliation trend northeast and dip southeast, but elsewhere exposures are too incom-

plete to permit an accurate determination of the structure.

DISTRIBUTION AND OCCURRENCE OF THE PEGMATITES

Sills and dikes of mica-bearing pegmatite are scattered unevenly through a belt about 28 miles long and 2 to 10 miles wide (pl. 25; fig. 72). They appear to be largest and most abundant in two areas, one at the western end of the district and the other a short distance east of its center. These are:

1. The Montevideo area, which is the larger. It comprises about 50 sq. mi. in Anderson County, S. C., and Elbert and Hart Counties, Ga. It includes at least 35 deposits, most of which are north of the Elberton-Iva highway and within a few miles of the Savannah River.
2. The Airline area, at the west end of the district. It embraces about 30 sq. mi. in western Hart County, Ga., and contains 16 known deposits.

Two small groups of prospects, one 4 miles east of Iva, S. C., and the other in and southwest of Dewey Rose, Ga., contain 4 and 3 deposits, respectively. Other deposits are scattered through central, eastern, and northeastern Hart County.

The east-west pegmatite belt is transverse to the northeastward-trending regional structure, but most of the pegmatite bodies trend northeastward. Most are enclosed by mica gneiss or schist. The M. L. Gaines and Cooley pegmatites, which are in granite, are similar in attitude, composition, and internal structure to neighboring deposits that are in metamorphic rocks. All the pegmatites are thoroughly weathered near the surface, and unkaolinized plagioclase is present only in the lowest part of the Waterhole mine.

GENERAL STRUCTURAL FEATURES OF THE PEGMATITES

The pegmatite bodies range in maximum thickness from about 3 ft at the Skelton prospect to at least 25 ft in the Green Rose mine. A wide range of thickness is characteristic of the deposits in both the Airline and the Montevideo areas, and the average thickness probably is 10 ft or more. The average length of the pegmatite dikes in the Airline area probably is less than that of those in the Montevideo area, which include the Gaillard (at least 900 ft), the Crawford-Daniel (at least 650 ft), and the Carter and Alexander (possibly 900 and 500 ft, respectively, according to Furcron and Teague, 1943, pp. 161, 168). Only the pegmatite at the Skelton prospect appears not to continue for several hundred feet along its strike. The most nearly continuous known deposit in the Airline area, the Banister, is at least 700 ft long. The Wood pegmatite probably



FIGURE 104.—Index map of South Carolina, showing the location of the mica deposits.

is little more than 250 ft long, and no other body in the area is known to measure more than 200 ft.

The depth to which the pegmatite bodies extend is known to range widely. The H. and P. and McKinney pegmatite sills are bottomed at a depth of 15 ft or less, whereas the sill at the Banister mine appears to be finger-ing out at a depth of 60 ft in the northeast workings. The downward extent of most of the deposits, however, is not determinable. Through most of the district the pegmatite bodies trend north to northeast, but local di-vergencies are not uncommon. Northwest to west

strikes have been recorded at the Rowland and Scott mines, for example, as well as at the Brown Apple and Todd prospects.

WALL-ROCK ALTERATION

Most of the contacts between pegmatite and wall rock are sharp. Some are very irregular, owing to pendants and septa of schist or gneiss or to thin apophyses of pegmatite that extend into the enclosing rock. The country rock adjacent to the Horsehead deposit is thoroughly impregnated with feldspar and quartz, but

in general there is little evidence of extensive reaction between pegmatite and wall rock, particularly where the wall rock is granite. Some recrystallization and enlargement of mica flakes can be recognized in the metamorphic rocks, and some silicification can be identified in those that are adjacent to very quartzose pegmatites like the H. and P. and McKinney. Sillimanite in the schist that surrounds the Wood deposit apparently was altered to sericite by reaction with the pegmatite solutions.

INTERNAL STRUCTURE OF THE PEGMATITES

MONTEVIDEO AREA

Many of the pegmatite bodies in the Montevideo area contain discontinuous cores of quartz that are surrounded or flanked by coarse-grained, perthite-rich intermediate zones. The wall zones are rich in plagioclase. The border zones, which tend to be discontinuous and thinner than the other units, range widely in composition. The most continuous units are the wall zones, although all types of zones vary considerably in persistence from deposit to deposit. Most of the cores are lenses 5 ft or less in maximum thickness, and few of those exposed at the surface are known to extend to depths of more than 25 ft. The longest observed lens (or individual core segment), which is little more than 100 ft, is that in the Martin deposit.

The intermediate zones, like the cores, tend to be monomineralic. Plagioclase occurs as veinlets in large perthite masses and in aggregates of quartz and mica that are interstitial to such masses. A few large mica books are scattered through plagioclase pockets in a perthite-rich intermediate zone at the Martin mine. The zone boundaries generally are sharp where they are adjacent to the flanks of cores or core segments, but beyond the ends of the innermost units the plagioclase-quartz-mica pegmatite of the wall zones tends to grade into a similar granitoid rock that contains 10 to 50 percent perthite. In some deposits this material in turn grades into coarse, blocky perthite that fringes the ends of the massive quartz bodies. In deposits like the M. L. Gaines well-faced crystals of perthite project into the quartz in a manner that suggests comb structure.

The wall zones can be traced along the entire exposed length of most of the pegmatite bodies. They consist chiefly of plagioclase, with subordinate quartz and muscovite. In some deposits biotite is present as well. The mineral grains generally are 1 to 6 in. in diameter. The quartz is present as small grains between the feldspar blocks and in granular aggregates a few inches in diameter. It tends to be slightly smoky. Thin selvages, or border zones, can be recognized locally along the

margins of some deposits. At the Gaines mine a border zone of mica-free, plagioclase-rich pegmatite contains spindles of quartz that are oriented normal to the contact with the country-rock granite. The discontinuous selvage in the Cooley deposit, which also lies against granite, contains a 1/4-in. outer layer of plagioclase and a 1- to 1 1/2-in. inner layer of granular quartz and small mica.

AIRLINE AREA

The deposits in the Airline area and in outlying parts of Hart County range widely in internal structure. Some appear to be essentially homogeneous, but others are divisible into two or more sharply defined units. Although most of the zones are symmetrically distributed, the development of others is notably uneven, particularly from one end of a deposit to the other. Relations are further complicated by fracture-controlled units, as well as by unusually fine- or coarse-grained pegmatite masses of uncertain origin.

The deposits in which zonal structure is poorly developed generally are medium- to coarse-grained aggregates of plagioclase, quartz, perthite, muscovite, and accessory minerals. In some, like the Rowland, recognizable concentrations of book mica may be most abundant near the hanging wall, but in most the mica is scattered either uniformly or sporadically through the mass. Other nearly homogeneous pegmatites consist chiefly of quartz with scattered small books of muscovite. Much of this material is typical burr rock, and the remainder is similar in composition but distinctly coarser grained. Feldspar and accessory minerals are present in very small quantities only.

Three pegmatite bodies on the Banister and Garner properties (pl. 25) consist almost entirely of granular quartz that resembles the material in the cores of the neighboring feldspathic deposits. Superficially they appear to be unzoned, but mica and tourmaline occur locally near their margins and flanking aggregates of plagioclase and quartz probably constitute thin, discontinuous wall zones. Such deposits may therefore be considered examples of zoned pegmatites in which the cores are exceptionally thick relative to the outer zones.

Poorly zoned pegmatite bodies with complex structure occur at the Banister and Garner mines. They contain many tabular inclusions of mica schist and relatively small, lenticular masses of quartz. The quartz lenses and inclusions tend to be oriented parallel with the wall-rock contacts. The quartz appears to have been formed in parts of the deposit between the largest and most widely spaced inclusions and thus may be likened to individual cores that were developed in the largest masses of uninterrupted pegmatite. In

deposits where the inclusions are relatively large and widely spaced, the tabular quartz masses are correspondingly large, in some places as much as 20 ft long. Where inclusions are small and abundant, however, the corelike segments are small or absent.

Many of the deposits contain more than one zone but differ from those of the Montevideo area in the virtual absence of perthite. They contain central quartz masses that are surrounded or partly surrounded by coarse-grained plagioclase-rich intermediate zones, some of which contain large mica books. The wall and border zones also contain abundant plagioclase, with or without small books and flakes of mica. The wall zones are the most continuous units, and the cores the least continuous. The most persistent quartz mass in the area, that at the Bailey mine, is about 100 ft long and is nearly coextensive with the exposed length of the pegmatite sill in which it occurs.

Masses of fine-grained plagioclase-quartz pegmatite occur in coarse-grained plagioclase-rich rock in the Wood deposit. In most places this material is in the interior part of the dike, but in at least one exposure it is near and along one of the walls. Similar fine-grained masses occur in the middle of the Horsehead deposit. Their distribution and texture indicate that they are not typical zones, but they are too poorly and discontinuously exposed to permit their detailed study. A medium-grained plagioclase-quartz-muscovite-biotite pegmatite mass at the Scott mine is at least 10 ft thick. Near its center is a 6- to 12-in. layer of much coarser grained plagioclase-quartz-muscovite pegmatite. The coarser material appears to cut the other rock; hence the pegmatite body probably is composite.

Fracture-controlled pegmatite units are not uncommon in the district, but they constitute an almost negligible proportion of all the pegmatite material. In the Banister mine steeply dipping layers of tourmaline crystals that cut plagioclase-rich pegmatite appear to have been formed in part by replacement of the pegmatite along fractures. Layers of quartz cut across fine-grained pegmatite in the Scott deposit, and the coarse perthite of several pegmatites is veined by aggregates of plagioclase, quartz, and mica. In the Martin deposit a mass of plagioclase-quartz pegmatite with coarse book mica crosses a zone contact and probably was fracture-controlled. Some of the crosscutting units may have been formed prior to final consolidation of the pegmatite. Others, however, appear to be of later, possibly hydrothermal origin.

MINERALOGICAL FEATURES OF THE PEGMATITES

The pegmatites of the Hartwell district are mineralogically simple. Eight hypogene species have been identified; these are plagioclase, perthitic microcline,

quartz, muscovite, biotite, tourmaline, beryl, and garnet. Quartz, the most widespread constituent, forms most of the pegmatite cores, is present as interstitial material in nearly all other zones, and also occurs in late-stage crosscutting units. Plagioclase, the most abundant mineral, is the chief constituent of wall zones, in which it is characteristically associated with quartz, muscovite, and biotite. It is sparsely scattered through most of the perthite-rich intermediate zones as well. It is completely kaolinized in even the deepest workings of all mines but the Waterhole.

White to flesh-colored perthite is abundant in all the Montevideo pegmatites but is rare in those of the Airline area. It occurs in the interior parts of the deposits, generally in intermediate zones, where it forms crystals or blocky masses 6 in. to several feet in diameter. In some pegmatites it occurs in medium-grained aggregates with plagioclase, quartz, and minor mica. The perthite in all deposits has been softened or reduced to friable masses by weathering, but none appears to have been completely kaolinized.

Muscovite, which is most commonly associated with plagioclase and quartz, occurs as books that range in diameter from a fraction of an inch to 2½ ft. Its color ranges from dark yellowish green through shades of olive and brown to pinkish buff. Dark-brown biotite is associated with muscovite in several deposits and is especially common in the Montevideo area. Much of it has been weathered to soft, bronze-colored vermiculite.

Consolidation of the pegmatites in both the Montevideo and Airline areas appears to have begun with crystallization of plagioclase and minor quantities of quartz and mica. Later the formation of plagioclase was supplanted by that of microcline in the deposits of the Montevideo area, gradually in some places and very abruptly in others. In contrast, crystallization of plagioclase in the deposits of the Airline area was followed by development of book mica, rather than potash feldspar. In the deposits between Hartwell and Airline this stage does not appear to have resulted in development of large amounts of either potash mineral. Quartz formed throughout the period of pegmatite consolidation. Development of quartz cores was preceded or accompanied in some deposits by crystallization of coarse mica and accompanied in some by crystallization of a little beryl, tourmaline, or mica.

ORIGIN OF THE PEGMATITES

The distribution of pegmatites with respect to the large granite mass exposed in central and southern Elbert County does not immediately suggest a genetic relationship. The pegmatite belt does not occur along

the contact of the mass, and in addition it extends for many miles to the north and east.

A zonal arrangement of mica colors is clear in figure 105. In the Franklin-Sylva and Spruce Pine districts of North Carolina and in the western Piedmont of Virginia, where similar zoning of colors is evident, a body of granite to which the pegmatite may be related lies next to the area of green and stained mica. In the Hartwell district the small bodies of granite near the river, not the end of the large granite batholith mentioned, occur at the centers of the mica color zones. This suggests that these granitic bodies may be closely related to the pegmatites and may be distinctly different in age from granite of the Stone Mountain type. Interestingly, the same granite is evidently related to the intensity of metamorphism in the district, as mentioned on p. 294. It is characteristic of the Piedmont pegmatites that few can be related to a specific granite mass without much detailed study of the district geology. The Hartwell district shows exceptionally clear zoning of mica types for a Piedmont district.

Most of the pegmatite dikes and sills appear to have been emplaced along fractures, and their general parallelism suggests that the fractures form a single well-defined set. The Banister and Garner pegmatites probably were injected into sheeted zones or groups of closely spaced fractures. None of the pegmatite bodies is bounded by dissimilar wall rocks on its two sides, and drag of the country-rock foliation and other evidences of displacement along the pegmatite-controlling fractures were not observed.

Although most of the pegmatites appear to have crystallized from their walls inward, with development of a rather consistent mineralogic sequence, several are more complex. The irregular structure of some inclusion-rich pegmatite bodies appears to be due at least in part to crystallization about several centers—that is, about individual large inclusions—as well as from the walls. Thus the distribution of zones is governed in part by the walls and to varying degrees by individual inclusions. The zones of other pegmatites are crossed by fracture-controlled bodies of quartz, quartz and feldspar, or feldspar and other minerals.

Three pegmatite sills in the Airline area contain masses of finer- and coarser-grained rocks that cannot be explained simply as zones. At the Scott mine a tabular layer of coarse-grained pegmatite cuts finer-grained pegmatite and must have formed after the solidification of the finer-grained rock. A composite origin for this sill is clear. The Wood and Horsehead sills, on the other hand, contain masses of a fine-grained rock, which resembles granite, surrounded by coarse-grained pegmatite. Because of the thorough weathering of the rocks and the incomplete exposures of the

finer-grained masses, the age, composition, and genetic relations of the rocks cannot be determined. The fine-grained rock may be (1) a final aplitic product of the consolidation of the pegmatite, (2) granite younger than the pegmatite and intrusive into it, or (3) inclusions of granite from intrusive masses older than the pegmatite that were in the country rock. There is little evidence that either supports or opposes the first alternative. The second may seem unlikely, as there is no independent evidence that there is in the district a granite younger than the pegmatite. The third is opposed somewhat by the absence of known granite bodies near the Wood and Horsehead mines. The relations must remain uncertain until further studies can be made.

ECONOMIC ASPECTS OF THE PEGMATITE MINERALS

MICA

GENERAL FEATURES

Most of the mica obtained from the Hartwell deposits yields only small sheets. Although some books are as much as 2½ ft. in diameter, the average diameter of books in the deposits that have been worked probably is not more than 3 in. Less than 10 percent of the trimmed sheets that were obtained from most of the deposits during World War II was 1½ by 2 in. or larger. Sheets of this size, however, constitute 25 to 35 percent of the material from the six mines with the largest output.

Few of the mica books are badly ruled, with the exception of those in the Scott deposit. On the other hand, many reeved books occur in most deposits. The Bailey pegmatite contains flat-A and herringbone books, and flat-A mica occurs in several of the Montevideo deposits. Abundant large books of flat mica are more characteristic of the Montevideo pegmatites, although most of the material is so badly cracked that it can be used only as scrap. A small proportion of the mica from most of the Airline deposits is locky.

Lightly specked mica occurs in all parts of the district, but the specks are generally so scattered that they do not materially decrease the value of the books. Lightly to heavily stained mica has been obtained at a few prospects south and east of Airline, as well as in many mines in the central and northern parts of the Montevideo area. Curdy brown stains occur as lattice-like intergrowths that are parallel to and normal to "A" reeves in books from the Turner deposit. Individual rectangular lattices tend to be arranged radially to form six triangular segments on each complete cleavage piece. Most of the stained mica from other deposits contains feathery brown markings that intersect at an angle of about 60°. Almost all near-surface books

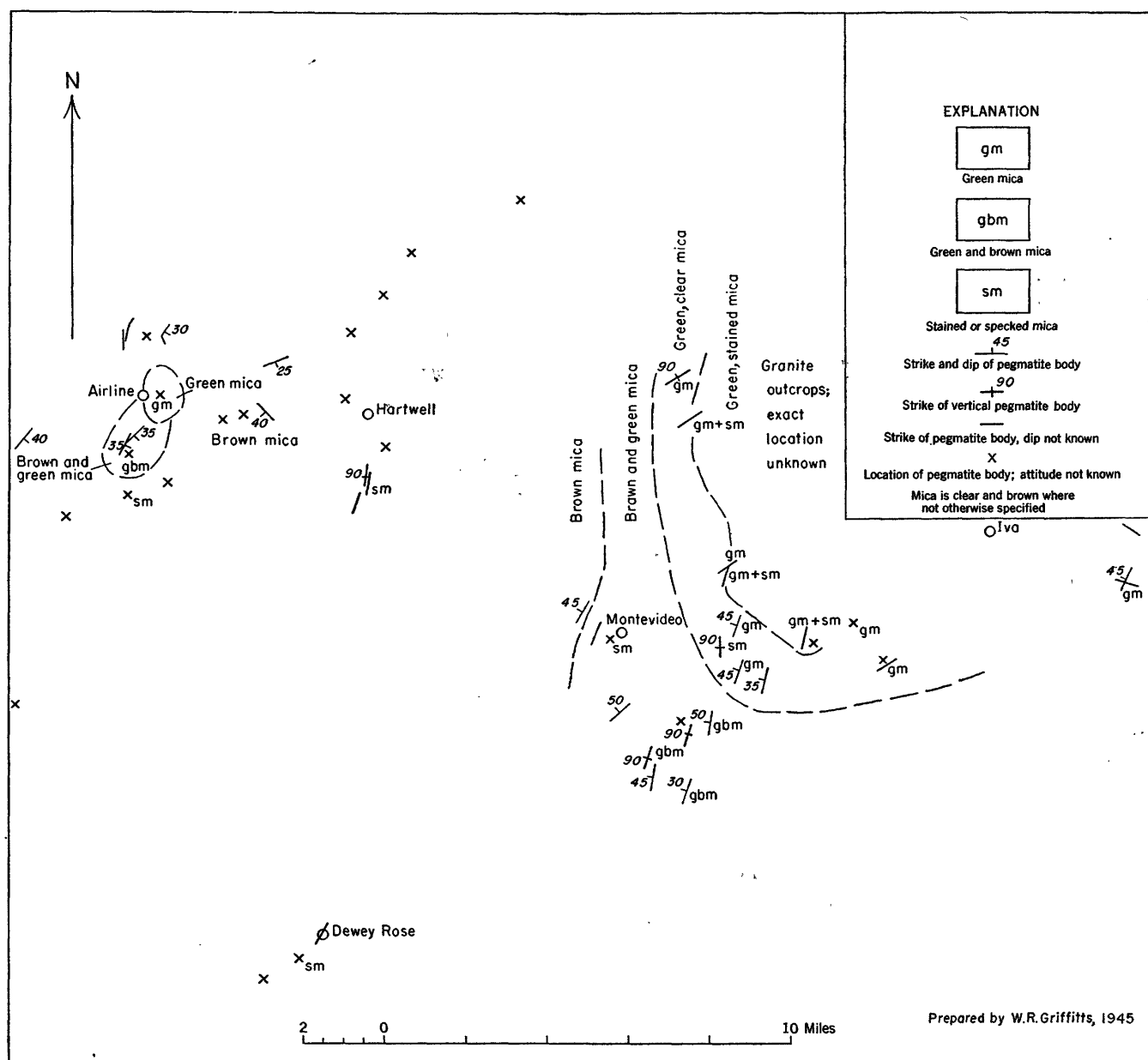


FIGURE 105.—Distribution of mica-bearing pegmatites and of mica colors in the Hartwell district of Georgia and South Carolina.

are lightly to heavily clay-stained, but some are sufficiently solid to yield clean sheets.

Most of the recently worked mines in the district yield pinkish to cinnamon-brown, or ruby, mica. Dark-yellowish to brownish-olive and brown micas also are present. Most of the stained mica is olive-colored, and nearly all greenish books contain some stained mica. The brown books are characteristically hard, flat, and clear, but some are wavy and lightly specked.

OCCURRENCE

The mica books that are scattered through plagioclase-rich zones constitute the most important source of sheet mica. In general these plagioclase-rich zones include

intermediate zones in the Airline deposits and wall zones in the deposits of both the Montevideo and Airline areas. Similar mica-bearing pegmatite occurs as cores in a few deposits. The mica content is generally highest near the margins of the pegmatite units. The mica books in the plagioclase-rich pegmatite are commonly hard and flat.

In several deposits that contain quartz cores, some books lie across the zone boundaries and extend into the quartz. Most of the books in perthite-rich intermediate zones are badly reeved, and many are soft. Probably few deposits in the Montevideo area could be satisfactorily worked for this mica alone. Production of soft, greenish books of flat-A mica from such

concentrations has merely augmented yields of flat brownish to pinkish mica from plagioclase-rich wall zones. Core-margin mica is of good quality only in deposits with little perthite.

Mica occurs in burr rock near the keel of a dike at the H. and P. mine. The extent of this material and its relation to other pegmatite units could not be determined. A little flat-A mica at the Martin mine occurs in a shoot that can be traced from a plagioclase-rich wall zone into a perthite-rich intermediate zone and hence may have been developed along a fracture.

The distribution of mica colors throughout the district appears to be systematic (fig. 105). The deposits in the northern part of the Montevideo area contain greenish mica. South and west of these are deposits that contain brown to pinkish-buff wall-zone mica and olive-colored or olive and brown core-margin material. Farther west are deposits that yield brown and pinkish-buff (ruby) mica only. Greenish mica was found at a few prospects east and south of Airline in the southeastern part of the Airline area, but the remainder of the pegmatites in Hart County contain pinkish-buff to brown material.

FELDSPAR

The locations of several feldspar deposits in Elbert County have been recorded by Sterrett (1923, pl. 11). Some of the mica-bearing pegmatites in the Montevideo area contain segregations of nearly pure perthite. Most of the material is very friable and easily broken, owing to weathering. Although the deposits occur at considerable distances from known markets, the production of high-quality feldspar as a byproduct of mica mining might be feasible.

OTHER MINERALS

Kaolin is a widespread and abundant constituent of the pegmatite bodies. Most masses of kaolin-rich material are less than 20 ft wide but commonly are several hundred feet long and extend to depth of several tens of feet. Few could be mined by hydraulicking without contamination by iron-stained wall rock.

Beryl does not appear to be abundant enough to be mined as an ore of beryllium, and none of the pegmatities contains much satisfactory gem beryl. Crystals and grains of tourmaline and garnet are too small and too sparse to be of value, either for gems or for industrial use.

MINING

HISTORY

The first systematic attempt to obtain mica in the district was made soon after 1900, when the Chapman mine was opened. Other mines and prospects were

opened and intermittently worked during the following years, but it was not until 1940 that several mines were in simultaneous operation. Activity increased during the succeeding months and reached a peak in the winter of 1943-44. By March 1945, however, no deposit in the district was being worked on a full-time basis. Most individual mining operations have been short-lived. Only the Chapman, Banister, and Garner mines and perhaps the Gaillard have been worked steadily for a year or longer, but other deposits, especially several of those in the Airline area, might well support continuous operations for comparable periods.

MINE WORKINGS AND MINING METHODS

Before World War II most deposits were mined by hand methods and on a small scale. Decomposed rock was broken with picks and moved with shovel, wheelbarrow, bucket, and windlass. Few of the workings were extended below the water table. During recent years, however, the use of power hoists and pumps has permitted mining to deeper levels. Waste was removed from the open-cut of the Garner mine by means of hoist and dragpan. Most of the other deposits were worked by means of shallow shafts and short, irregular drifts. Many of the workings are the result of unsystematic mining, generally known as "gophering."

PRODUCTION

Little is known concerning mica production from the district before 1942, but it probably was not large. The Chapman mine is reported to have yielded much mica, presumably many hundreds or several thousands of pounds, but no record is available. Most of the early production probably came from the Chapman and Gaillard mines. Between June 1942 and January 1945 a total of 5,702 lb of trimmed punch and sheet mica was sold. About 2,800 lb, or 49 percent of the total, was obtained from deposits in the Airline area, and about 910 lb, or 16 percent, from those of the Montevideo area. Nearly 29 percent of the total output was obtained from the Garner and Bailey mines. The mica produced in the district during World War II comprised 5 percent no. 1 quality, 35 percent no. 2, and 60 percent no. 2 inferior.

FUTURE OF THE DISTRICT

During World War II the total production of mica and the average production per mine were much greater in the Airline area than in the Montevideo area. Mica-bearing pegmatites in which little or no development work has been done are known to occur in the Airline area, which thus seems to offer promise of appreciable production during future periods of favorable prices. In addition, the Garner, Bailey, and Wood deposits may

contain moderate reserves of small-sheet mica, and substantial reserves of punch material may be present in the Banister deposit.

Experience has demonstrated that the working of most deposits in the district should be based on the results of surface exploration. Trenches or series of shallow pits constitute a relatively inexpensive means of determining the continuity of pegmatite bodies and of the zones within them. Such knowledge is particularly helpful in the Montevideo area, where concentrations of mica rarely are more continuous than the lenticular and podlike quartz cores of the deposits. Moreover, mica concentrations are rarely coextensive with the cores, which are the only parts of most deposits that are naturally exposed. Although the near-surface mica may be badly clay-stained, much information concerning other, more widespread defects and the size of books can be obtained from such material. Thus it may be seen that the most critical defects are cracks in the mica from the Montevideo deposits and reeves in that from the Airline deposits.

DESCRIPTIONS OF DEPOSITS

ABBEVILLE COUNTY, S. C.

The information in the following descriptions of prospects in Abbeville County, S. C., was obtained from the Colonial Mica Corporation.

Brown prospects.—Several mica deposits occur on the property of F. L. Brown, 3½ miles east of Iva (location 46, fig. 104). One, known as the Brown Apple, was opened in 1943 by R. A. Gibbs and was developed more thoroughly during the summer of 1944 by L. L. Heaton. A 17-ft shaft and two 12-ft shafts were sunk in dry weathered rock. The pegmatite dike, which occurs in mica schist, strikes N. 74° W. It contains a massive quartz core that is surrounded by kaolinized fine-grained feldspathic pegmatite. Small quantities of both light reddish brown and light-green micas were obtained, but few of the books yielded sheets larger than 1 by 1 in.

During 1944 Heaton sank seven prospect pits and shafts 4 to 20 ft deep in the deposit known as the Brown Cherry. Both the pegmatite dike and the foliation in the mica schist country rock are said to strike N. 25° E. and dip about 45° WNW. The pegmatite contains one or more thin, tabular bodies of quartz.

Vandiver and Cooke Scott prospects.—A mica-bearing pegmatite dike that is exposed on the Cooke Scott and Elisa C. Vandiver properties (location 47, fig. 104) was explored during the summer of 1944 by L. L. Heaton. An old adit was lengthened from 40 to 89 ft, and a 30-ft shaft was sunk. The thickness of the pegmatite, though not known exactly, is fairly large. The

dike, which strikes about N. 10° E., is composed of feldspathic pegmatite that is deeply weathered. The mica is reddish brown and flat, but the books are so small that they yield no sheets larger than 1 by 1 in.

OUTLYING ANDERSON COUNTY, S. C.

One deposit in Anderson County, S. C., outside the Montevideo area is worth mention. According to Andrew W. Todd, owner of a property 3½ miles east of Iva (location 45, fig. 104), a 10-ft shaft was sunk in mica-bearing pegmatite in 1914 and a total of 8 sacks of mica was recovered. During the summer of 1944 exploration by J. C. Jones demonstrated that the pegmatite dike strikes N. 60° W. and dips steeply west. It is 2 ft thick and contains a quartz core that is flanked by kaolinized feldspar. No mica was found by Jones, but flakes of reddish brown flat-A material are present on the old dump.

ANDERSON COUNTY, S. C., AND ELBERT AND HART COUNTIES, GA.: MONTEVIDEO AREA

FRETWELL PROSPECTS

A belt of mica-bearing pegmatite has been traced for nearly a mile on the property of J. J. Fretwell, in Anderson County, S. C., about 1½ miles west of Barnes (locations 39 and 44, fig. 104). Three deposits that crop out on small knolls about 200 yd apart were examined in 1913 by Sterrett (1923, pp. 283–284), from whose report a part of the following description has been abstracted. The light-gray soil derived from weathering of the pegmatites is rich in scattered blocks of quartz and plates of mica and can be readily traced across the fields because it contrasts with the darker soil derived from the country-rock schists. The pegmatite outcrops, which trend about N. 60° E. (Sterrett, 1923, fig. 82, p. 284), probably do not represent one continuous pegmatite body.

Little work has been done on the middle and southwest pegmatites, although weathered sheets of mica are locally abundant and fragments of beryl were found in at least one place. Near the northeast end of the area are two prospect pits that were dug on each side of a small gully. A little mica was obtained from these openings, in which the pegmatite appears to be a dike with an easterly strike and a gentle dip. The country-rock foliation strikes north-northeast to northeast and dips gently to moderately east-southeast to southeast. Mica occurs sporadically in the pegmatite as irregular groups of crystals. Some books are as much as 8 in. in diameter and would yield 2-by-3-in. sheets. The mica is clear light brown and splits well, but it is rather badly clay-stained.

Another mica-bearing pegmatite was prospected on land, owned by Fretwell, on the northeast bank of the

Savannah River about a quarter of a mile above the mouth of Big Generostee Creek. An open-cut that was made around an outcrop of quartz exposed mica-bearing pegmatite with abundant large crystals of perthite. Blue-green to yellowish beryl crystals also were found. A 30-ft tunnel was driven beneath the open-cut, but without encouraging results.

BELL PROSPECT

A prospect was opened on the W. P. Bell property, 4 miles S. 56° W. of Iva, Anderson County (location 43, fig. 104), by William Miller about 1914. It was reopened during the spring of 1944 by J. C. Jones, who found badly broken and weathered "A" mica books in a pegmatite dike that strikes northeast.

BEN MARTIN MINE

Old workings on the property of Mary E. Martin and Mary O. Martin, 5 miles S. 60° W. of Iva, Anderson County (location 42, fig. 104), were reopened and enlarged in July 1944 by Rosamond McNeely, of Anderson. They now comprise an open-cut 70 ft long, 30 ft wide, and 30 ft deep, an incline that slopes southward from the south end of the cut, and a crosscut that extends eastward from the northeast corner of the cut. The pegmatite dike, which trends north, is more than 30 ft thick at the surface but tapers downward to 14 ft at the 20-ft level.

A vertical quartz mass, which strikes N. 15° E. and is about 10 ft thick, is exposed in both ends of the cut. It thins to 3 ft about 20 ft below the south rim. The quartz is flanked by a 2- to 5-ft intermediate zone of partly kaolinized blocky perthite. Some individual perthite masses occupy the full thickness of this zone. The remainder of the exposed pegmatite consists of kaolinized plagioclase with interstitial quartz.

Both flat cinnamon-brown and brownish to yellowish-olive "A" micas occur in the deposit. Flat books as much as 6 in. in diameter are scattered through the plagioclase-rich wall zone. Most are badly cracked and would not yield sheet material. A few small greenish "A" books occur within the quartz core, and large "A" books are clustered along its margins. They are also associated with interstitial quartz in other parts of the intermediate zone and are exposed near the eastern contact between the intermediate and wall zones. The latter concentration, which forms a tabular mass, appears to cut across the zone boundary and may be a late-stage, fracture-filling feature. Although the mica content of the deposit is moderately high, the recovery of sheet from the cracked or reeved mine-run books is low. About 75 percent of the obtainable sheet mica contains black specks, brown mineral stains, and green

organic vegetable stains. The remaining sheets are clear but small.

GAILLARD MINE

The Gaillard mine, in Anderson County, about 6 miles S. 75° W. of Starr (location 39, fig. 104), was opened many years ago and has been worked during at least three different periods. The most recent mining was done in 1942 and 1943 by Fred Raney, of Anderson. Three groups of old workings form a row that trends N. 20° E. and is about 900 ft long. They comprise eight shafts, ranging in depth from 15 to 40 ft, and several irregular pits. Drifts are said to have been extended from several of the shafts, but most of the underground workings are now inaccessible. During the most recent operations a trench 200 ft long, 40 ft wide, and 25 ft deep was dug along the deposit near the south end of the old workings.

The country rock, as exposed in the workings and in the creek bed south of the mine, is a folded and crenulated biotite gneiss that is locally rich in granitic and pegmatitic material. The trend of its foliation ranges from northeast to north-northwest, and the dip, which is moderate, from east-northeast to southeast. The main pegmatite body appears to be a nearly vertical dike that strikes north-northeast. It ranges in thickness from 5 to 25 ft and is said to be thickest in the middle workings. Inclusions and elongated septa of gneiss are not uncommon. A second pegmatite body was encountered in a shaft sunk about 150 ft west of the main workings.

In the main dike yellowish-green mica occurs sporadically in kaolinized feldspathic pegmatite that surrounds a series of lenticular white quartz masses 2 to 3 ft thick. It is most abundant along the margins of these masses, which tend to occur a few feet from the west wall of the dike. Most of the mica books are small, although crystals yielding sheets 10 in. square are said to have been recovered from the main workings. The chief defects are clay staining, ruling, and quartz intergrowths. Some of the books are speckled, but most are clear and free splitting.

Also, light-greenish mica occurs on the Keown farm, which adjoins the Gaillard property.

J. M. SKELTON PROSPECT

The J. M. Skelton deposit is in Elbert County, Ga., 300 ft east of the Skelton home, which is beside the Iva-Elberton highway and a mile west of the Savannah River (location 4, pl. 25). Mining was started in 1942, when three shafts were sunk and connected by drifts at a depth of about 12 ft. The pegmatite dike, which is enclosed by granite, strikes N. 15° E. and dips 30° to

40° W. It was incompletely exposed when the prospect was examined in the spring of 1945.

A discontinuous core of massive quartz is flanked by a perthite-rich intermediate zone, which occupies the middle of the dike where the quartz is absent. Flat, pinkish-buff mica occurs in a 4- to 8-in. zone that flanks the perthite-bearing rock. In contrast, flat-A mica of similar color probably occurs adjacent to the quartz masses, but this material could not be closely examined in place. Some of the books may be 6 in. or more in diameter. Many are cracked and wavy, some are reeved, and all are clay-stained.

COOLEY MINE

The Cooley mine, which is owned by Dr. John Cooley, of Hamilton County, Tenn., is in Elbert County 0.6 mile northwest of the Elberton-Iva highway and 1.5 miles west of the Savannah River (location 3, pl. 25). It was operated in the fall of 1943 by O. E. Thomas and in the spring of 1944 by R. A. Gibbs. The workings are fairly extensive to a depth of 20 ft. The pegmatite is a 2½- to 4-ft dike that strikes N. 20° E. and dips 45° W., and the country rock is coarse-grained granite.

The dike contains a massive quartz core, around which are rectangular blocks of partly kaolinized perthite. Between the potash feldspar and the walls of the dike is a mica-bearing zone that is rich in kaolinized plagioclase. In some places the walls are marked by a plagioclase-rich selvage, and the remainder of the border zone consists of 1 to 1½ in. of granular quartz with a little mica. Beryl is a minor constituent of the dike.

Both flat and "A" mica books have been obtained from the deposit. Some of the mineral is light yellowish green, and some is pale cinnamon brown. Although the books may be as large as 6 by 8 in., many are badly cracked and clay-stained. About 1 percent of the mine-run mica can be recovered as sheet material, most of which is wavy. The proportion of recoverable book mica in the pegmatite is about 3 percent.

TURNER PROSPECT

The Turner prospect, which is owned by the Wateree Power Co., is in Elbert County about 1.8 miles north of the Iva-Elberton highway and 2.0 miles west of the Savannah River (location 2, pl. 25). A pit 15 ft long, 6 ft wide, and about 5 ft deep has been dug in a pegmatite dike that strikes north. Material on the dump indicates that a core of quartz is flanked by a perthite-rich intermediate zone and a plagioclase-rich wall zone. Flat-A mica is fairly abundant. Some books are relatively large and would yield 2-by-3-in. sheets. All, however, are heavily stained, with brown inclusions that are in rows parallel and normal to the "A" reeves.

Most sheets are further marred by shallow, closely spaced crenulations.

CRAWFORD AND DANIEL MINES

The Crawford and Daniel mines are in Elbert County, on the Iva-Elberton highway at a point 2.6 miles southwest of the Savannah River (locations 5 and 6, pl. 25). The Crawford shaft is 20 ft north of the road, and the two Daniel pits are 215 and 430 ft southwest of the shaft but in the same deposit. The southwest part of the deposit was opened by a Mr. Caraway in 1942, was worked in 1943 by R. A. Gibbs, and was again reopened—also in 1943—by L. L. Heaton, who sank the Crawford shaft.

With the exception of a small pit about 80 ft west of the Crawford shaft, all the openings are in a pegmatite dike that strikes N. 10° E. and dips 45° to 55° W. The shaft exposes a core of massive quartz that is flanked by an apparently discontinuous zone of blocky perthite. To the south the quartz occurs as separate lenses and the perthite zone is thicker and more continuous. In the southernmost pit the central rock unit, which is about 10 ft thick, consists chiefly of perthite in blocks 2 to 5 ft in diameter, with a few small masses of quartz. The outer part of the dike is an aggregate of plagioclase, quartz, and muscovite. This wall-zone pegmatite contains a little biotite 215 ft south of the Crawford shaft.

Both wall-zone and core-margin mica concentrations are present. The wall-zone books are flat, whereas those along the quartz are of the flat-A type. At the Crawford shaft all the mica is cinnamon brown, but that from the southernmost pit is brown to brownish olive and is specked. Some of the mica books including both the flat and the "A" varieties, are as much as 6 in. in diameter. Most are badly crumpled and cracked. About 90 percent of the mica sheets obtained by Heaton were smaller than 1½ by 2 in. Much small-sheet mica was obtained in the lowest drift from the Crawford shaft, which was driven at the 27-ft level, or about at the water table. Additional mica-bearing pegmatite is present below this level.

CHAPMAN MINE

The Chapman is the most extensively worked mine in Elbert County and, with the possible exception of the Gaillard mine, in the entire district as well. It is on the Chapman estate immediately north of Coldwater Creek and a quarter of a mile south of Rock Branch (location 15, pl. 25). The deposit was opened about 1900 and was subsequently worked in 1907, 1910, and 1913 and during the period 1924–26. By 1924 the workings included several cuts and shafts in a line trending north-northeast, a long drift that had been

driven into the hillside above Coldwater Creek, and a short cross-cut adit northeast of the drift. C. M. Wacaster then extended the drift in soft, weathered pegmatite and is reported to have obtained substantial quantities of good mica. After a long period of idleness, the mine was reopened in 1944 by J. W. Walker, but little mica was recovered.

The country rock is a mica schist that strikes N. 35° to 50° E. and dips 45° to 60° SE. Thick tongues of granite are reported to extend northward into this schist a few hundred feet east and southeast of the mine (Furcron and Teague, 1943, p. 167). The pegmatite body is nearly concordant, but in detail its contacts cut across the structure of the country rock and the body itself trends in a slightly more northerly direction than the country-rock structure. Its thickness ranges from 3 to 9 ft in the mine workings, with a possible average of about 7 ft. Inclusions of schist, which range from thin films to large tabular masses, are abundant in the pegmatite. The dike is well zoned, with a quartz core that is surrounded successively by coarse perthite-rich pegmatite and somewhat finer grained plagioclase-rich pegmatite.

Book mica occurs in the plagioclase-rich wall zone

pl. 25). Very little work was done on the deposit until November 1944, when H. C. Turner and Doc Alexander excavated several cuts and sank two shallow shafts. M. L. Gaines, the present owner, dug several trenches early in 1945. The outcrop of the dike has been explored irregularly for a distance of 120 ft along its strike.

The country rock is a fine- to medium-grained granite that contains quartz, kaolinized feldspar, muscovite, and probably biotite. The pegmatite body is a vertical dike that strikes N. 15° E. In the southern shafts and drifts a core of massive quartz is partly surrounded by a discontinuous perthite-rich zone. Individual feldspar crystals project into the quartz in a manner that suggests comb structure. The outer 6 ft of the dike is chiefly a kaolinized wall zone of plagioclase-rich pegmatite. The thin border zone contains spindles of quartz that are oriented normal to the contact. South of the quartz mass the wall zone constitutes most of the dike, and perthite-plagioclase intermediate-zone pegmatite occupies a central position. About 50 ft north of the main core segment, which appears to plunge steeply north (fig. 106), is a second mass of quartz that contains a little beryl.

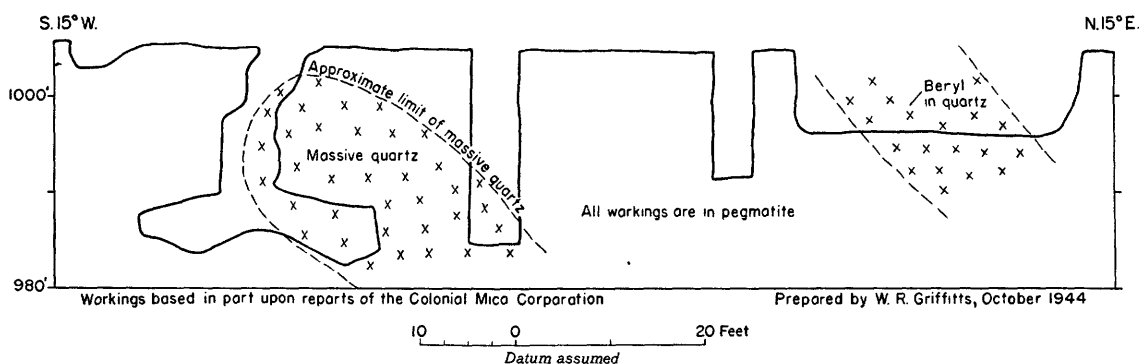


FIGURE 106.—Longitudinal section of the M. L. Gaines mine, Elbert County, Ga.

and, in smaller quantities, along the margins of the quartz core. Much is specked, lousy flat-A material, although that obtained from the long drift is said to have been relatively free from these defects. Clear cinnamon-brown mica is said to have been found on the east side of the quartz mass and stained mica west of it.

About a quarter of a mile north of the mine an open-cut exposes a large pegmatite body with irregular quartz segregations (Sterrett, 1923, p. 75). Masses of wedge-A and herringbone mica are thickly packed around the bodies of quartz. No sheet mica is reported.

M. L. GAINES MINE

The Gaines mine is in Elbert County. It lies in a field several hundred yards west of a dirt road and 0.5 mile north of the Elberton-Iva highway (location 12,

No rich concentrations of mica are present in parts of the deposit in which the core is not developed. Brownish to yellowish-olive flat-A mica of poor quality occurs along the margins of the core, and flat, light-brown to cinnamon-brown mica occurs with nodules of quartz in the plagioclase-rich wall zone. The brown books are most abundant along the inner edge of the zone and in a concentration 1 to 1½ ft from the east wall of the dike. The books are hard, relatively free from reeves and ruling, and not badly cracked. Some, however, are lousy. Mineral stain is absent, and clay staining is not heavy below a depth of about 4 ft. Between 30 and 40 percent of the trimmed sheets are 1½ by 2 in. or larger. The books of greenish "A" mica range from 3 to 8 in. in diameter. The material is soft, reeved, and badly cracked.

CHURCH PROSPECT

A pit about 8 ft deep exposes a pegmatite dike north of a church and on the east side of a dirt road 0.5 mile north of the M. L. Gaines home in Elbert County (location 11, pl. 25). The pegmatite resembles that worked in the Gaines mine. It contains a quartz core at least 4 ft thick, with a flanking intermediate zone of perthite. Plagioclase-rich pegmatite forms a wall zone of unknown thickness. The core pinches out westward and upward in the pit, where its crest is overlain directly by the wall zone. The mica content of the plagioclase-rich pegmatite is fairly high, perhaps as much as 7 percent. Some of the books are 5 in. across, but most are cracked. The mineral is hard and cinnamon brown. Some is ruled, but reeving is rare. Most of the mica is accompanied by a little quartz and biotite. Some soft, greenish flat-A mica found on the dump probably is from the intermediate zone.

ALBERT BROWN PROSPECT

Pale reddish-brown mica of the flat-A type is reported to occur in a pegmatite on the Brown property in Elbert County, 7 miles south of Hartwell and 2 miles from Bethesda Church. The country rock is garnetiferous mica-sillimanite schist.

CARTER MINE

The Carter mine is in southeastern Hart County 4 miles southeast of Nancy Hart School and $\frac{2}{3}$ mile west of Montevideo (location 9, pl. 25). According to Mack Carter, the owner, a shallow pit had been dug in the deposit about 1925 and had been subsequently filled. During 1943 and 1944 Carter and L. L. Heaton, of Miami, Fla., excavated two holes 15 and 20 ft deep and later refilled them. A third cut, 3 to 5 ft wide, 15 ft long, and 10 ft deep, was open in December 1944.

The country rock is not exposed, but several inclusions of coarse-grained quartz-mica gneiss occur in the pegmatite. The strike of the deposit could not be determined, but the distribution of irregular masses of quartz within it suggests that it might trend northeast. The dip probably is vertical. The most persistent mica concentration is said to have trended north to north-northeast. The quartz masses occur with kaolinized perthite in a matrix of weathered plagioclase-quartz pegmatite.

Mica is present along the edges of the irregular bodies of quartz, in kaolinized feldspar embedded in the quartz, and in and near nodules of quartz embedded in plagioclase. Nearly all the books occur in pockety concentrations that are 1 to 10 ft long and that may plunge south. The mica is light cinnamon brown, clear, hard, and free splitting. Clay staining is not heavy. About a fourth to a third of the mica is reeved and some

is cracked, but very little is ruled. About a third of the trimmed sheets are $1\frac{1}{2}$ by 2 in. or larger.

SHIFLETT PROSPECT

In the spring of 1944 L. L. Heaton prospected a deposit on the R. L. Shiflett property, 1.1 mile northwest of Montevideo in southeastern Hart County (location 8, pl. 25). Small books of pinkish-buff mica are scattered through a pegmatite dike that strikes N. 20° to 25° E. and dips 45° WNW. The dip appears to vary with depth. Large books of "A" mica are embedded in the east side of a quartz lens that is exposed in a drainage ditch on the property (Furcron and Teague, 1943, p. 160).

OTHER MINES AND PROSPECTS

The following three descriptions of deposits in the Anderson County portion of the Montevideo area were abstracted from the report by Sterrett (1923):

Terry prospect.—A mica prospect was opened years ago on the old Terry property, about 6 miles west of Iva. An open-cut 35 ft long was sunk on the side of a small knoll. Many small sheets of mica have been left around the cut, and white quartz float is abundant on the adjacent slopes.

Sherard mine.—Intermittent mining operations have been carried on over a period of many years on the old Vandiver Sherard property, $6\frac{1}{2}$ miles N. 80° W. of Iva (location 40, fig. 104). The first opening was a 30-ft shaft from which drifts were extended. Later a 25-ft shaft was sunk about 100 ft N. 20° E. of this first opening, and drifts were extended to the north and south. An adit was next driven 140 ft from a point lower on the hillside to the east, and the mine was worked through it. About 70 ft from its portal the adit intersected another dike, along which drifts were extended. After these workings collapsed, a new shaft was sunk west of the deposit to a depth of 35 ft, and the pegmatite was reached by means of a crosscut.

The country rock is hornblende gneiss that contains streaks and layers of mica schist. The pegmatite bodies cut the country-rock structure irregularly. The main dike, which is about 15 ft in maximum thickness, strikes N. 20° E. and dips west. It contains a discontinuous quartz core, two parts of which were exposed in the oldest shaft. The pegmatite that was cut in the adit is about 10 ft thick and contains many inclusions of mica schist. The mica books in this dike were small. Most of those obtained from the main pegmatite were likewise small, but some large sheets are said to have been recovered. The mineral is light brown to greenish brown and is locally specked. It has a good cleavage, but most books are badly clay-stained and broken.

Wharton mine.—Mica has been obtained on the Sam Wharton property $6\frac{1}{2}$ miles N. 82° W. of Iva (location

40, fig. 104). The workings, which appear to be on the same belt of deposits as the Sherard mine, consist of an open-cut along the northwest side of a small stream, two crosscut tunnels, and an adit a few feet northeast of the open-cut. At the end of the adit a small room is said to have been excavated. The country rock is decomposed mica schist with streaks of hornblende schist. The foliation strikes northeast and has a variable dip. The pegmatite dike, which cuts across the country rock irregularly, pinches from a thickness of 15 ft in the open-cut to a few inches in the tunnel at the northeast end of the workings. Sheets of mica as much as 8 in. across are present in the dumps, and a few pieces would yield 2-by-3-in. sheets. The mineral has a greenish cast and splits well, but it is badly clay-stained and ruled.

There is another prospect pit 200 ft west-southwest of the main workings. On the dump are blocks of hard pegmatite that contains small mica books.

Descriptions of additional deposits in the Anderson County portion of the Montevideo area are based upon data provided by the Colonial Mica Corporation:

Keown mine.—During the summer of 1943 two shafts were sunk by J. C. Jones on the property of James Keown, 8 miles south of Starr. A pegmatite dike that strikes about N. 60° E. was followed downward in a 20-ft shaft and was found to pinch out with depth. A little clear, greenish small-sheet mica was obtained.

McKee prospect.—Float of clear, reddish-brown mica books indicates the presence of a pegmatite dike on the property of H. L. McKee, which adjoins South Carolina Highway 184 at a point 4 miles west of Iva (location 41, fig. 104). The dike may be several hundred feet long.

The information on the following five deposits, all in the Elbert County portion of the Montevideo area, was obtained from the report by Furcron and Teague (1943):

Alexander mine.—Substantial quantities of mica are said to have been obtained from a deposit on the old Alexander property (location 13, pl. 25), which is now owned by Mrs. Ethel Galaway, of Tampa, Fla. The mine workings, which are in a line that trends north-northwest, are between the Elberton-Iva highway and the Chapman mine. They include a shaft and at least six pits, most of which were excavated by Brown and Bailey.

The pegmatite dike, which strikes about N. 20° W., contains a nearly continuous quartz core. The mica is clear but is badly ruled and much marked by "A" structure. Part of it is locky. There are 3-by-8-in. fragments, some of which would yield punch material, in the dumps. Intergrowths of small biotite flakes are common.

Several pits were dug for mica in an area 650 to 800 ft N. 30° E. of the tenant house. The pegmatite body, which strikes N. 10° E. in hornblende gneiss, consists of kaolinized feldspar, quartz, and very light brown mica. All the mica books exposed are small and badly fractured, and some are warped and locky. The prospect is not especially promising.

New Bethel M. E. Church prospect.—Some prospecting was done in 1942 by Frank Daniel on the north side of the Elberton-Iva highway 2 miles northeast of the New Bethel M. E. Church. A 12-ft thickness of pegmatite is exposed in a pit 6 ft deep. Cracked and warped fragments of mica 2 by 3 in. or smaller are present in the dump.

Rock Branch Church property.—A mica-bearing pegmatite body is exposed at a depth of about 30 ft in the well of Rock Branch Church, which is about 1¼ miles north-northwest of the intersection of Rock Branch with Coldwater Creek. The pegmatite body dips northwest. In the dump are 1-by-2-in. plates of flat, clear brown mica and a few fragments of "A" mica. Quartz-and-mica float is present in a field northeast of the church and is in line with the strike of the pegmatite body exposed in the well.

C. U. Gaines prospect.—Mica occurs in cultivated fields on the C. U. Gaines property, which is about a third of a mile southwest of the school at Montevideo (location 10, pl. 25). The books, which are 2 by 3 in. or smaller, are flat and free splitting, but some of the sheets contain black spots. Some mica was mined about 25 years ago in a pegmatite dike on the west side of the Montevideo-Elberton road. Gaines states that the workings have been filled.

Ward prospect.—Two mica occurrences have been prospected at points southwest of the R. M. Ward residence, which is a mile southwest of Rock Branch High School and nearly a mile northeast of the intersection of Rock Branch with Coldwater Creek (location 14, pl. 25). Some trenching was done prior to 1917 along a pegmatite outcrop at the edge of a pine grove. During World War I a 25-ft shaft was sunk and a little drifting was done in pegmatite from its bottom. The shaft was cleaned out about 1940, and a small amount of mica was recovered. The pegmatite dike, which is at least 6 ft thick, strikes N. 35° E. and dips 45° WNW. A discontinuous core of massive quartz is surrounded by kaolinized feldspathic pegmatite that contains both plagioclase and perthite. The mica in the dump is medium brown and contains scattered long, narrow black spots. Ruling and "A" structure are other defects. The largest books are about 3 by 4 in.

Sheet mica valued at \$75 was obtained by Ward at a point about a thousand feet from his residence. The pegmatite dike, which was worked in a cut 30 ft long

and 25 ft in maximum depth, is reported to be about 4 ft thick and to dip 55° NW. The largest mica books, about 6 in. in diameter, were obtained from a concentration along the hanging-wall contact. The mica is brown. Most is flat, but some flat-A books were noted.

The information in the following descriptions of deposits in the Elbert County portion of the Montevideo area was obtained from the Colonial Mica Corporation:

J. H. Craft prospect.—In November and December 1943 J. H. Craft explored a pegmatite dike on his farm, 4 miles east of Montevideo (location 1, pl. 25). He sank four shafts to depths of 11 to 19 ft and dug two 5-ft pits. The dike, which strikes N. 20° E. and dips about 45° W., was found to pinch out at shallow depths. It contains a quartz core that is surrounded by kaolinized feldspathic pegmatite. The recovered mica was flat, and some sheets were as large as 3 by 4 in. Mica in the dumps is reddish brown; some is speckled.

Several other pegmatite dikes probably are present on the property.

J. H. Moore mine.—A deposit was opened during the summer of 1943 by L. L. Heaton on the property of J. H. Moore, 2 miles south of Montevideo. Three shafts were sunk, two to a depth of 12 ft and the third to a depth of 30 ft, to explore a pegmatite dike that strikes about N. 40° E. and dips 50° NE. It can be traced for several hundred feet along the strike and, in most of the workings, is about 6 ft thick. A discontinuous core of massive quartz is flanked by kaolinized plagioclase-rich pegmatite. Much mica was obtained above the 12-ft level, but none at greater depths.

Heard mine.—A prospect on the Heard property, half a mile from the Iva Elberton highway and about 4 miles southwest of the Savannah River bridge (location 7, pl. 25), was reopened in the fall of 1943 by Robert E. Kemmerer. The pegmatite dike strikes N. 20° E. and dips 30° W. at the outcrop. The dip steepens downward and is 80° at a depth of 57 ft. The dike is about 4 ft thick and can be traced along its strike for several hundred feet.

A quartz mass that was several feet thick at the surface pinched out at a depth of 15 ft. A series of smaller masses, which probably constitute a discontinuous core, was followed to a depth of 50 ft, where a second large segment was found. The remainder of the dike is kaolinized feldspar with scattered small flat books of both brown and greenish mica. They appear to be most abundant near the margins of the core. Few of them would yield sheets larger than 1 by 1 in.

Anderson mine.—A mica prospect was opened in 1940 or 1941 on the property of W. L. Anderson at a point 5 miles west of the Savannah River bridge and 1 mile north of the Iva-Elberton highway (location 16, pl. 25). It was reopened during the spring of 1944 by L. L.

Heaton, who sank two shafts to depths of 19 and 34 ft and drove a drift 44 ft N. 10° E. from the bottom of the shallower shaft.

A pegmatite dike, which is about 20 ft thick, has been explored for nearly a quarter of a mile along its outcrop. It strikes N. 10° E. and dips about 45° W. A quartz mass 5 ft or more thick lies against the hanging wall of the dike at the surface but occupies a more central position at depth. It may pinch out above the 34-ft level. The remainder of the pegmatite consists chiefly of kaolinized feldspar and interstitial quartz. Books of locky, lightly speckled brownish mica occur within the quartz mass and in the surrounding feldspathic pegmatite. Few would yield sheets as much as 1 in. square.

ELBERT COUNTY, GA.: DEWEY ROSE LOCALITY

Adams mine.—A small prospect pit was dug in the front yard of the J. H. Adams residence, which is 1 mile west of Deep Creek Church and about $2\frac{1}{2}$ miles southwest of Dewey Rose (location 3, inset, pl. 25). Apparently no mica concentration of commercial importance was encountered.

Dewey Rose prospect.—A small prospect was opened during recent years by J. H. Tate of Dewey Rose in a field about 500 ft N. 15° E. from his home (location 1, inset, pl. 25). A little sheet mica was obtained from a pegmatite that strikes about N. 30° E. It is probably thin but contains a quartz core. Much of the mica is ruled, but 2- by 3-in. trimmed sheets were recovered.

Frank Mewburn prospect.—Float blocks of quartz with attached large books of mica have been found on the Frank Mewburn property, 1 mile south of Dewey Rose (location 2, inset, pl. 25). Much of the mica contains tiny specks that are arranged in thin, curved lines or streaks of erratic pattern. Clear sheets as large as 6 by 8 in. have been obtained by careful rifting.

EASTERN AND CENTRAL HART COUNTY, GA.

ROWLAND MINE

The Rowland mine is 165 ft north of Georgia Highway 51 and 1.5 miles west of the Hartwell town square (location 19, pl. 25). It consists of two small open-cuts and two short inclines that were driven from a ditch at the side of an abandoned road. The deposit, which is owned by Mrs. C. E. Mathewson, of Hartwell, was worked by Y. G. Rowland, the tenant on the Mathewson farm.

The country rock is mica schist or gneiss whose foliation trends N. 70° E. and dips 25° to 45° SSE. Two concordant pegmatite lenses are exposed in the workings. The east lens is 7 ft in outcrop length and continues down dip for at least 10 ft. Its ends are blunt, so that it is roughly rectangular in cross section. A

small mass of quartz is exposed in the back of the incline, but it apparently pinches out between that point and the surface. The west lens, which once was exposed for a distance of at least 30 ft along the old road cut, was explored down dip in two places. Its edges are not exposed. The pegmatite consists chiefly of feldspar, with little mica or quartz.

Few mica books are exposed in place, but some were obtained from feldspathic pegmatite beneath the quartz in the east lens and some probably were encountered along the hanging wall in the west lens. No rich concentrations were found. The mineral is cinnamon brown; it is clear but somewhat clay-stained. Some books are tangled, and nearly all are small.

RUTH JONES MINE

The Ruth Jones mine is on the Jones farm about half a mile east of the Bio road and 1.5 miles south of Hartwell (location 20, pl. 25). It is on a northward-facing hillside and was worked in 1943 and 1944 by J. C. Jones. The No. 1 workings consist of a trench 20 ft long and 6 ft deep, a 32-ft shaft, an 8-ft cross-cut, and an 11-ft drift. The No. 2 workings include a 27-ft shaft, a 17-ft shaft, 30 ft of drifts at the 27-ft level, and a 25-ft incline.

Both groups of workings are in the same vertical pegmatite dike, which strikes N. 10° to 15° E. and is 8 to 15 ft thick. It contains many inclusions and septa of schist, one of which is exposed above the portal of the drift at the No. 2 workings. The 27-ft shaft is said to have been bottomed in schist, which either is another septum or is the country rock beneath the keel of the dike. The pegmatite consists chiefly of kaolinized plagioclase, and no large quartz mass is exposed. Both cinnamon-brown and brownish to yellowish-olive books of muscovite are scattered abundantly through the deposit. The books are relatively large but tend to be lumpy. Some contain tourmaline crystals. Clay staining is common, but no mineral stains are present.

SCRAP MINE

At the Scrap mine, which is about 350 ft southeast of the Ruth Jones mine (location 21, pl. 25), a pegmatite dike that strikes nearly north has been worked to a depth of about 10 ft. Large mica masses occur along the margins of a quartz core. They include wedge- and herringbone books, some of which weigh as much as 50 lb. The mica is brown to cinnamon brown and is heavily speckled. Much is lumpy.

H. AND P. AND McKINNEY MINES

Several pits were dug during recent years on the Harper and Pierman property, as well as on the McKinney property to the north. Both are near the Bio

road 2.3 miles south of Hartwell (location 23, pl. 25). O. E. Thomas, W. G. Miltenberger, Ralph Payne, and H. P. Lammerts worked the H. and P. deposit at various times between 1941 and 1945. The pegmatite bodies are very rich in mica but do not continue for more than 20 ft down the dip or for more than 50 ft along the strike. They trend N. 20° E. and are composed of kaolinized feldspar and burr rock. The McKinney pegmatites are similar. The mica is light cinnamon brown. Some of the books, particularly those in the burr rock, are tangled, and some contain black specks and tourmaline crystals.

SCOTT MINE

The Scott mine is near the top of a northward-facing hillside on the Scott farm, 600 ft south of Georgia Highway 51 and 3.6 miles west of the Hartwell courthouse (location 25, pl. 25). The workings consist of two shallow trenches and an incline that slopes 41° S. 15° W. to a depth of 20 ft. The country rock is a garnetiferous mica schist that contains quartz and kaolinized feldspar. The foliation is somewhat contorted in the excavations, where it strikes N. 40° W. to N. 15° E. and dips southwest to west.

Most of the pegmatite body is a relatively fine-grained aggregate of kaolinized feldspar, quartz, muscovite, and weathered biotite. It contains inclusions of schist that are 1 in. to 3 ft thick. They trend east and dip 20° to 40° S., and their foliation is not everywhere parallel with their elongation. A tabular mass of coarse-grained pegmatite that is 6 to 12 in. thick lies near the middle of the dike. It strikes about east and dips 40° S. It is biotite-free but contains quartzose nodules, with associated muscovite and garnet. Along parts of the northwest wall of the cut it lies directly beneath schist inclusions, but elsewhere it lies above such inclusions or is enclosed by the finer-grained pegmatite (fig. 107). Steeply dipping layers of quartz about 1/2 to 1 1/2 in. thick cross all the pegmatite units.

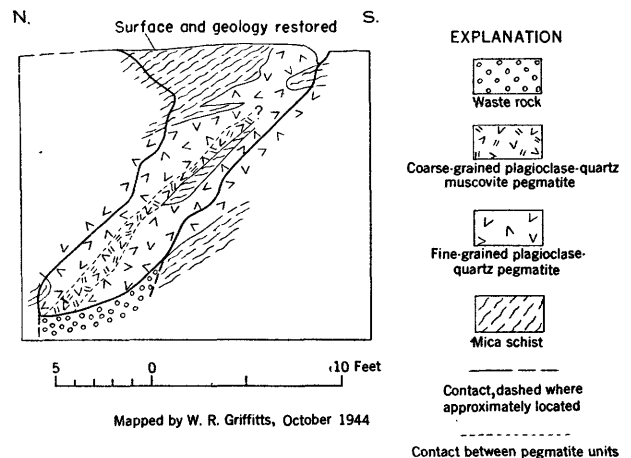


FIGURE 107.—Cross section of the Scott mine, Hart County, Ga.

Book mica is exposed in the coarse-grained pegmatite only. It is most common at the margins of pods or nodules of quartz. Few books are larger than 3 by 5 in., and near-surface material is weathered and clay-stained. About 10 percent of the books are reeved, 15 percent are locky, and most are ruled, but cracks are not common. The mica is pale cinnamon-brown.

OTHER MICA OCCURRENCES

Deposits of clear mica are reported to occur on the following properties:

Name	Location
T. A. Anderson---	4 miles southwest of Hartwell on Bio road (location 24, pl. 25).
Bobo-----	In town of Hartwell.
Burco-----	1 mile south of Hartwell on Georgia Highway 77 (location 22, pl. 25).
R. H. Burns-----	Do.
Sula McCurley---	4 miles north of Hartwell (location 17, pl. 25).
Old Parks property (Luther Shiflett, owner).	5 miles east of Hartwell.
Sloan Reed-----	4 miles from U. S. Highway 29 and near Savannah River.
Isam Sanders---	Midway between Airline and Hartwell.
Scott and Haley---	2 miles south of Georgia Highway 51 and 4 miles west of Hartwell.
Thorton (Mrs. J. C. Jones, owner).	In town of Hartwell. Dike strikes N. 20° W.

HART COUNTY, GA.: AIRLINE AREA

BAILEY MINE

The Bailey mine is near Crossroads, 5.5 miles west of Hartwell (location 26, pl. 25). It is owned by Sam Bailey, of Hart County, and was operated in 1944 and 1945 by the Payne brothers. A shallow pit was dug in 1932 by a North Carolina miner, and the more recent workings include four pits and an irregular tunnel that connects three of them at a depth of about 8 ft (fig. 108).

The country rock is quartz-muscovite schist that contains small quantities of feldspar and sillimanite. Garnet is not common. Concordant quartz lenses a few inches to 1½ ft long occur in gullies west of the mine. The foliation of the schist strikes N. 5° to 30° E. and dips 30° to 40° E. to ESE. Its attitude is uniform in the large gully east of the mine but varies greatly in the exposures along the south side of the road. Most of the mining in 1944 was done at and north of a bend in a pegmatite sill that is discontinuously exposed for a strike distance of at least 120 ft. North of this bend it strikes N. 35° E. and dips 30° to 35° ESE., and to the south it strikes N. 20° W. and dips 20° to 25° E.

At the bend itself the dip steepens from 18° at the surface to 60° at a depth of 12 ft (section *D-D'*, fig. 108).

The pegmatite body comprises three nearly continuous zones. A 5-ft core of massive gray quartz is flanked by a 2-ft intermediate zone of plagioclase-muscovite pegmatite. The mica, which constitutes 25 to 50 percent of this unit, occurs as very large books. Many extend across the full width of the zone. The wall zone, also about 2 ft thick, consists of plagioclase with very little quartz. Locally it is separated from the wall rock by a layer of granular, slightly smoky quartz and small mica books that is an inch or two thick. Some of the books are as much as 2 in. across. The quartz core apparently pinches out northward along the strike of the dike and may plunge south.

The size of the mica books varies, both along the strike and down the dip of the deposit. Large books were found in the drift and in pit 3 and may have been concentrated near the bend in the sill. All the large books near the quartz contain flat-A or herringbone structure. They yield about 3 percent trimmed sheets, 40 percent of which are 1½ by 2 in. or larger. The books that occur near the walls are flat and free splitting, but most are too small to yield sheet material. All the mica is yellowish olive to cinnamon brown. None is specked, but some sheets obtained from the "A" mica are lightly clay-stained.

PROSPECTS NEAR THE BAILEY MINE

A pegmatite dike that contains large books of flat-A mica is exposed in the road from Crossroads to the Wood mine, about a mile west of Crossroads. It trends N. 20° E. and dips 55° W. and consists of plagioclase, quartz, perthite, mica, and accessory tourmaline.

Flat-A mica books occur along a quartz core in another dike that is exposed in a gully several hundred yards S. 60° W. of the deposit here described.

WOOD (GULLY, LON ALLEN) MINE

The Wood mine is 1 mile southwest of Crossroads (location 27, pl. 25). It was opened in 1919, when Lonnie Allen sank a 15-ft shaft on the Martin (then Gully) farm. In 1940 or 1941 a Mr. Fox sank a 25-ft shaft that is known as the "Waterhole" (not to be confused with the Waterhole mine). He is reported to have found good mica, but he had difficulty in handling a heavy flow of ground water. Much mining has been done recently by Joe Wood and Ernest Wood. The largest opening is a cut near the north end of the deposit. It is 30 ft long, 15 ft wide, and at least 23 ft deep, and its floor is covered with an unknown thickness of debris. A row of eight pits and partly filled shafts extends 125 ft S. 10° W. from the open-cut to a shaft that was sunk in 1944 by Henry Grindstaff (fig. 109).

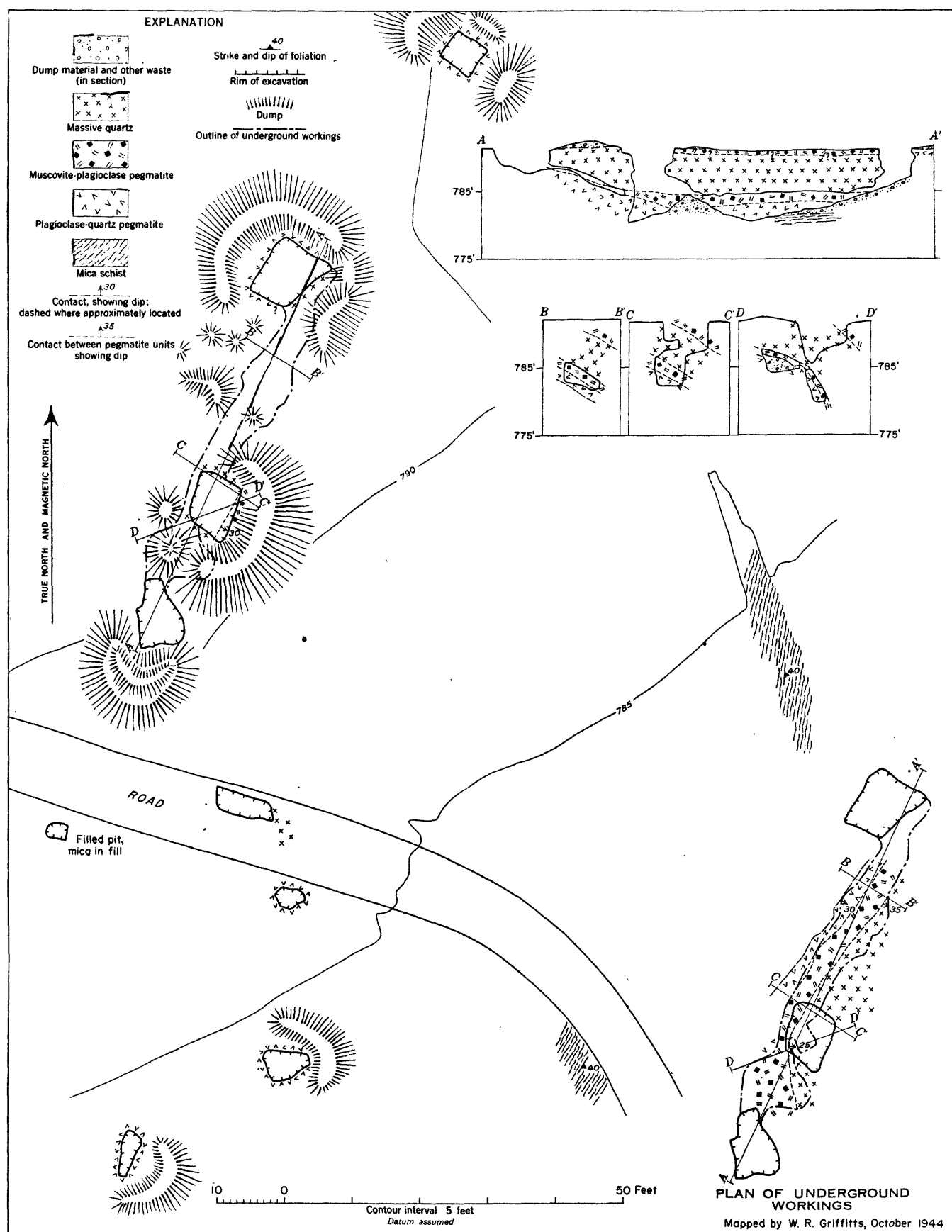


FIGURE 108.—Geologic map, plan, and sections of the Bailey mine, Hart County, Ga.

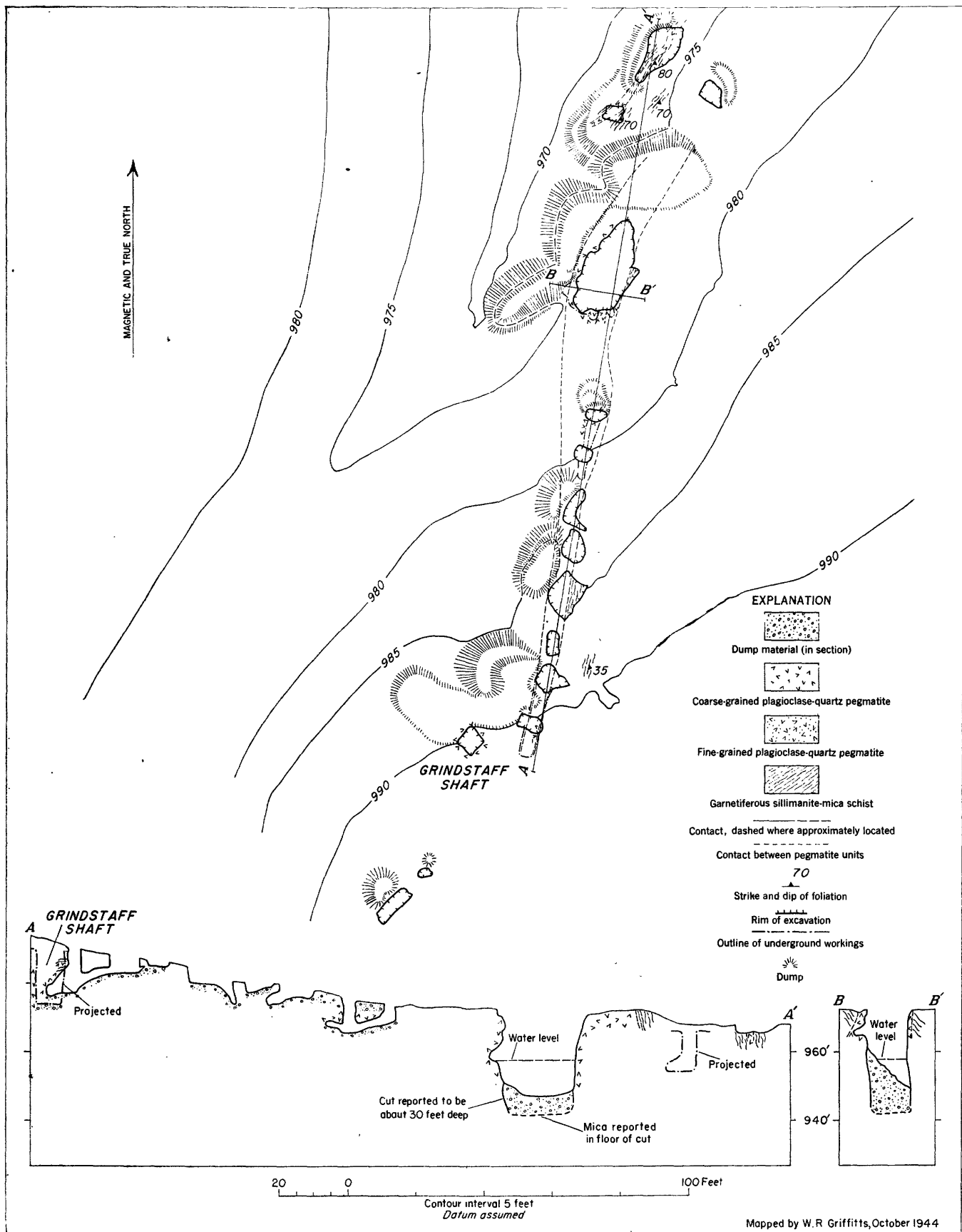


FIGURE 109.—Geologic map and sections of the Wood mine, Hart County, Ga.

A small pit and a shaft were dug 50 ft north of the open-cut.

The country rock is garnetiferous sillimanite-mica schist whose foliation strikes N. 10° to 40° E. and dips 35° to 70° E. to SE. The sillimanite content is generally less than 10 percent, but some thin layers and small nodules are estimated to contain as much as 80 percent of this mineral. Some sillimanite appears to have been altered to sericite near the pegmatite. The strike of the main pegmatite body must swing eastward from N. 10° E. to at least N. 40° E. between the open-cut and a pit 45 ft to the north-northeast (fig. 109). It probably is parallel to the thin pegmatite sill exposed in the northernmost pit. Its east contact is exposed only in the cut, and the west contact is not exposed. The dike is at least 15 ft thick in the cut but is said to taper to 3 ft in one of the south shafts.

The pegmatite minerals are kaolinized feldspar, quartz, tourmaline, and muscovite. A fine-grained variety of pegmatite is exposed in the south end of the open-cut, in the nearest cut to the south, and in the southeasternmost opening (fig. 109). In this southeast shaft it lies along the east wall of the dike, whereas in the other exposures it is separated from the wall by at least 3 ft of coarse-grained pegmatite. The exposed contact between pegmatite and country rock is very irregular in detail. Several schist inclusions are present in the west wall of the main cut, and nearly horizontal layers of schist, probably projections from the east wall, alternate with pegmatite in the south wall of the southeast shaft. A second pegmatite body that is exposed in the two openings 50 ft north of the cut is reported to be parallel with the main dike, 20 ft west of it, and to extend southward to the vicinity of the Grindstaff shaft. It may be the body that was worked from the shaft.

The position of the workings in the north end of the area suggests that mica was most abundant along the flanks of the fine-grained pegmatite masses and beneath inclusions of schist. Books also may be sparsely scattered through the coarse-grained pegmatite. No continuous, clearly defined mica shoot has been found although mica is said to be abundant in the bottom of the open-cut. The books are light pinkish buff and free from mineral stains. Some are clay-stained, but clean sheets have been obtained by careful rifting. Many of the books left as mine scrap are tangled and reeved. About a quarter of the sheet mica that was sold was 1½ by 2 in. or larger.

WATERHOLE MINE

The Waterhole mine is on the Martin farm, 700 ft S. 50° W. of the Wood mine and 1.4 miles southwest of Crossroads (location 28, pl. 25). It was leased to

Corb C. Robinson and H. R. Grindstaff, of Celo, N. C., in 1944. A shaft that had been sunk by Lon Allen in 1935 was cleaned out and deepened to 44 ft (fig. 110). The pegmatite body, a dike at least 20 ft thick, strikes north in a sillimanite-bearing mica schist whose foliation strikes N. 35° E. and dips 60° ESE.

The pegmatite minerals are plagioclase, quartz, muscovite, tourmaline, garnet, and beryl. No large quartz masses are exposed on the surface, but one was encountered in the bottom of the shaft. Book muscovite is concentrated within 2 ft of the east wall of the dike. It is pale brown to brownish olive. Most books are free splitting and free from both mineral and clay stains, but a few contain small tourmaline crystals.

BANISTER (OLD MOSS) MINE

The Banister mine, which is 1 mile south of Airline (location 29, pl. 25), was operated at various times by W. G. Miltenberger, Ralph Payne, H. P. Lammerts, and Howard Banister. The workings include a 700-ft row of pits and a shaft with three appended drifts at the northeast end of the row (pl. 26). The country rock is garnetiferous mica schist that is locally rich in sillimanite. Its foliation trends northwest to west-northwest and dips 30° to 45° SW. A lens of granular quartz, 300 ft long and 30 ft thick, lies 100 ft southeast of the southwestern workings. A little tourmaline and a few skeletal crystals of muscovite occur in its outer part, but feldspar was observed only in cuttings from a shallow auger hole just beyond its margin.

The main pegmatite body is a sill that is 2 to 7 ft thick and is discontinuously exposed for 700 ft along its strike. It thins southwestward. Many tabular inclusions of schist are oriented parallel with the walls of the deposit. In the lowest drift it is split into two or three sills that are 12 to 18 in. thick. The pegmatite is composed of kaolinized feldspar, quartz, muscovite, tourmaline, and garnet. Tourmaline occurs with muscovite and quartz in burr rock and in thin, steeply dipping feldspathic layers. It is most abundant near the hanging wall and in a few 1- to 3-in. layers in the country rock above the hanging wall, and it may well have been formed along fractures. Quartz occurs as thin, tabular masses in the pegmatite. These are parallel with the schist inclusions.

Mica has been found along the entire exposed length of the deposit. It occurs in small pockets beneath quartz masses, as well as beneath and at the ends of inclusions. These pockets are not concentrated in any one part of the body. The mica associated with the quartz is too badly reeved to yield sheet material, and the books that occur elsewhere in the pegmatite are small. Many are tangled or cracked. Few of the ex-

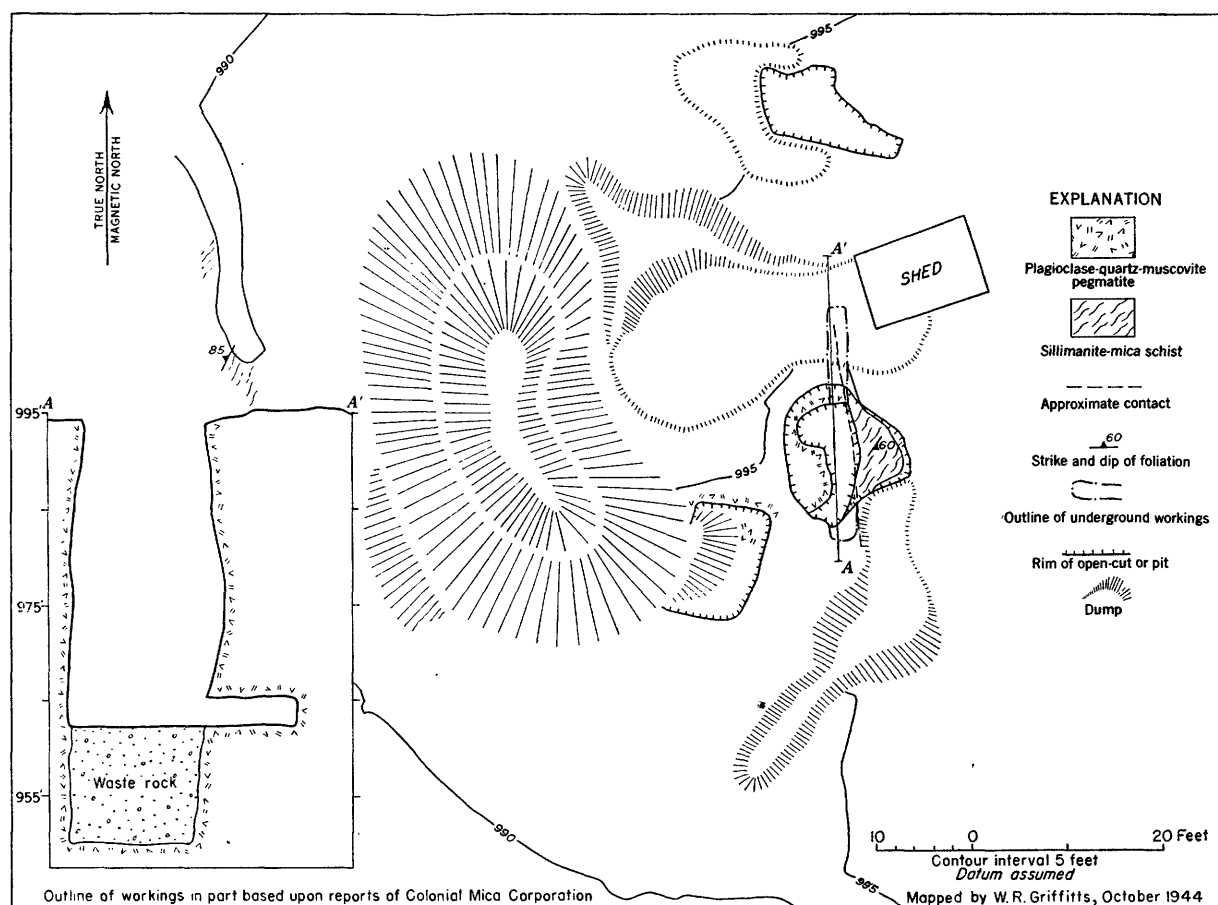


FIGURE 110.—Geologic map and section of the Waterhole mine, Hart County, Ga.

posed books would yield sheets 2 by 3 in. or larger. The mica is clear and brown, but much is clay-stained.

Reserves of small-sheet mica probably are large, but recovery of this material would necessitate the mining of most or all of the pegmatite body, owing to the absence of a well-defined mica shoot.

GARNER MINE

Mica has been mined on the property of Truett Garner since 1941 by Ralph Payne, by W. G. Miltenberger and Phil Stovall, of Sylva, N. C., and by several other persons. The deposit is north of the Garner residence and 1 mile south of Airline (location 30, pl. 25). During 1944 George Rose and Mack Rose of Mitchell County, N. C., developed an open-cut 70 ft long, 40 ft wide, and 25 ft deep and drove drifts northeast from its northeast end and southwest from its southwest corner (fig. 111). All the rocks are weathered in the deepest workings. The softness of the ground and the high level of the water table have made underground mining difficult.

The country rock is a fairly coarse grained quartz-muscovite-biotite schist that contains kaolinized feldspar, tourmaline, and garnet. Its foliation strikes

N. 28° E. and dips 35° to 50° ESE. The pegmatite body, which is essentially concordant, forks at the northeast end of the cut. The two branches are 3 to 10 ft apart and were exposed for nearly the entire length of the opening (fig. 111). They may pinch out at its southwest end. The pegmatite is composed of quartz, plagioclase, muscovite, and tourmaline. Tabular bodies of granular gray quartz, which may form a discontinuous core, are embedded in medium- to coarse-grained plagioclase-quartz pegmatite. Many inclusions of schist are present.

Muscovite is most abundant in coarse-grained plagioclase-quartz pegmatite near the hanging wall of the sill. The books are 1 to 8 in. in diameter and yield sheets that are wavy and lightly to heavily clay-stained. Nearly all are pale cinnamon brown. About a third of the full-trimmed sheets are 1½ by 2 in. or larger.

GREEN ROSE MINE

The Green Rose mine, which is south of the Truett Garner residence 1.5 airline miles south of Airline (location 31, pl. 25), was opened in April 1944. M. H. Rose, of Jonas Ridge, N. C., sank a 30-ft shaft and drove drifts south, west, northeast, and east from its

bottom before he discontinued operations late in the following month. The pegmatite and mica schist country rock are soft and thoroughly weathered. The schist is exposed only in one of the drifts. The pegmatite dike, which is at least 35 ft thick, contains moderately large quantities of both reddish-brown and greenish mica books, but the yield of sheet material from them is reported to be fairly low.

HORSEHEAD MINE

The Horsehead mine is approximately 2 miles south of Bowersville, and about 17 miles west of Hartwell (location 32, pl. 25). It has been operated during recent years by the Payne brothers, of Hart County, and by Henry Grindstaff, of Celo, N. C.; surface and mineral rights are owned by Fred Ridgway. Six shafts and two open-cuts have been dug in one pegmatite body (fig. 112). The two southern shafts are joined by a 30-ft drift and are connected to the other two shafts by more irregular workings. A second drift extends 13 ft southwest and a crosscut extends 22 ft east from the southernmost shaft. A small cut was dug in another pegmatite body about 60 ft to the east.

At and northwest of the workings the bedrock is covered by a 3- to 10-ft mantle of alluvium, but several pegmatite bodies are exposed in a gully 6 to 10 ft deep. The country rock is mica schist that is locally garnetiferous. Its foliation strikes northeast and dips 50° to 70° SE.

The main pegmatite body strikes N. 35° to 45° E. and dips 30° to 50° SE. On the northeast side of the gully it contains a 6- to 7-ft core of quartz that is flanked by a 5- to 10-ft zone of feldspathic pegmatite with several inclusions of schist. Neither contact of the body is exposed. Masses of granite are present in the central part of the pegmatite 40 ft southwest of the gully, where the body probably is about 14 ft thick. The country rock to the east is thoroughly impregnated with pegmatite.

Another pegmatite body, which is 17 ft thick, is exposed in the gully 60 ft southeast of the main mine workings, as well as in the small southeast cut. It is composed of feldspar and quartz, with a few mica books and ½- to 1-in. crystals of clear quartz. A third body of undetermined thickness, which lies farther

east, is separated from the second by pegmatite-impregnated schist.

No mica was observed in the pegmatite-impregnated schist, but flat book mica apparently occurs in feldspathic pegmatite near schist inclusions and "A" mica occurs along the margins of the large quartz mass in the main body. The books are pinkish buff and pale yellowish olive. Some are tangled, but few are ruled and only those along the quartz core are reeved. Some are clay-stained, but no mineral stain is present. Mica may well occur along the strike and down dip from the present workings, but further exploration of the deposit probably will be difficult, owing to the thick overburden.

OTHER MICA OCCURRENCES

Information on two additional deposits in the Airline area of Hart County was obtained from the Colonial Mica Corporation.

Bromer Ayers property.—Mica float occurs on the farm of Bromer Ayers, several miles southwest of Goldmine School. The books are clear and reddish brown, but do not yield good sheets.

McCrary prospect.—During the summer of 1944 Ralph Payne opened a deposit on the property of Mrs. Effie McCrary, 6 miles south of Airline. He sank a 20-ft shaft and dug several small pits. A little greenish mica was found in several pegmatite dikes that contain quartz cores.

Also, mica is reported to occur on the following properties. It is clear unless otherwise noted.

Name	Location
Hubert Cheek.....	1½ miles south of Airline.
Cole.....	2 miles north of Hartwell.
Lloyd Johnson.....	2½ miles south of Airline. Mica is stained.
Idell Jordan.....	3 miles south of Airline. Some mica is specked.
Kiefer Adams.....	Half a mile east of Airline.

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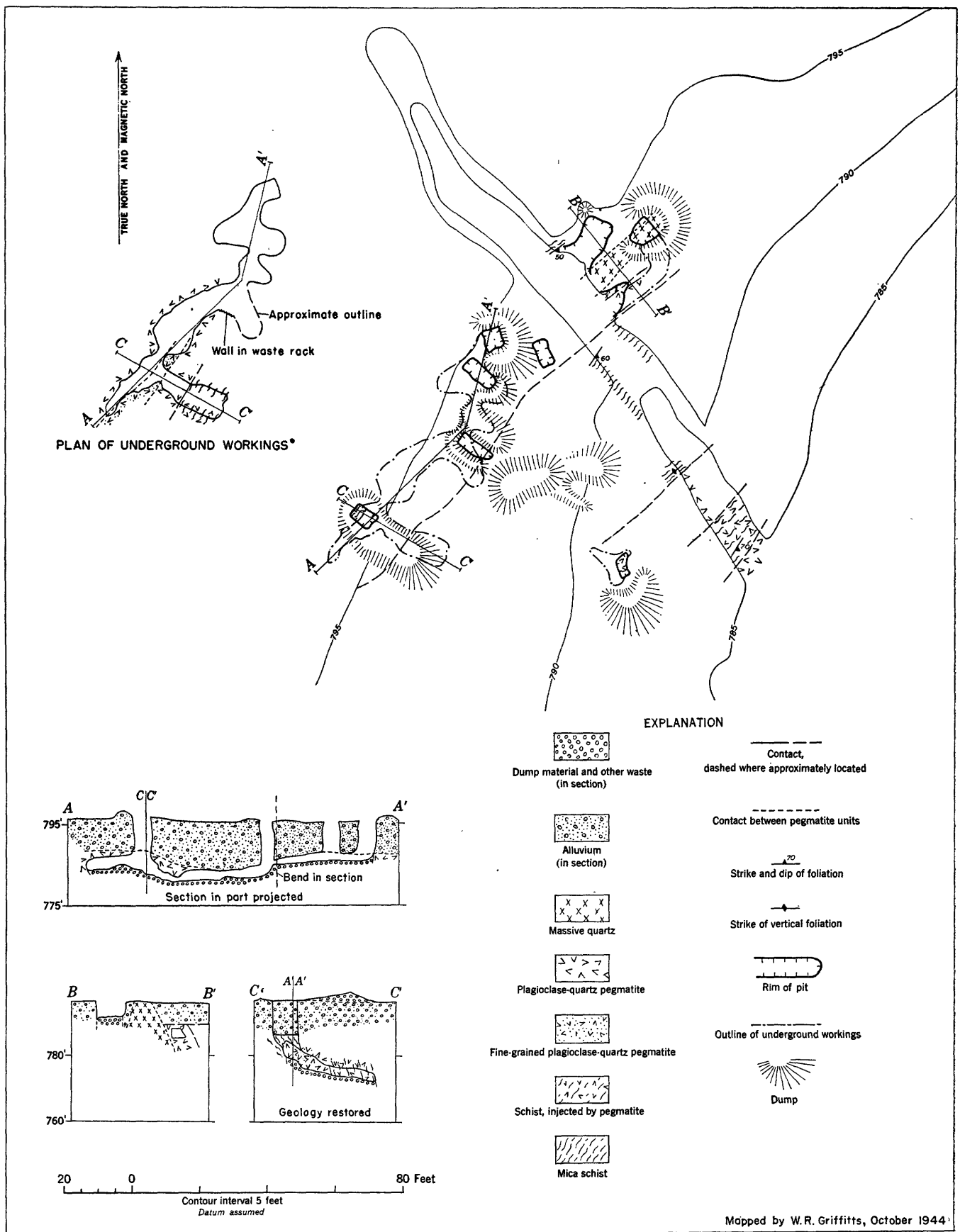


FIGURE 112.—Geologic map, plan, and sections of the Horsehead mine, Hart County, Ga.

PART 8. OUTLYING DEPOSITS IN SOUTH CAROLINA

By JERRY C. OLSON and WALLACE R. GRIFFITTS

ABSTRACT

Mica deposits very similar to those of the Hartwell district are scattered through several counties of South Carolina. They occur in a locality underlain by quartz-muscovite schist and muscovite-biotite schist and are most abundant in two broad areas. The production of mica has been small.

INTRODUCTION

The mica-bearing pegmatites in Abbeville and southern Anderson Counties, northwest South Carolina, are included in the Hartwell district of South Carolina and Georgia, but many others are scattered through Cherokee, Spartanburg, Greenville, Pickens, Oconee, and northern Anderson Counties (fig. 104). Three of these were examined many years ago by D. B. Sterrett. More recent investigations for the Geological Survey were made chiefly by J. C. Olson during the summer of 1941 and the spring of 1943, as well as by W. R. Griffiths and R. H. Jahns in the fall of 1944. Eleven mines and prospects were visited. Information concerning 33 other deposits was obtained chiefly from the notes of Sterrett (1923, pp. 285-286, 288) and from field reports of Colonial Mica Corporation engineers.

GEOLOGY OF THE AREA

The mica deposits occur in an area underlain by quartz-muscovite schist and muscovite-biotite gneiss. Sillimanite is locally abundant, and in Spartanburg and Greenville Counties it occurs near masses of granite (Smith, 1945). A light-gray medium-grained granitic rock forms sills in northeastern Cherokee County, northern Spartanburg County, and central Greenville County and possibly farther to the southwest. It consists of quartz, microcline, orthoclase, oligoclase, biotite, and muscovite, with accessory apatite, zircon, and magnetite (Smith, 1945, p. 299). The rock resembles the western-type granite of the Shelby district of North Carolina in occurrence, texture, mineralogy, and associated contact effects, and like that granite it contains accessory monazite (J. B. Mertie, Jr., oral communication, 1945).

GENERAL FEATURES OF THE PEGMATITES

Mica deposits are most abundant in two broad areas. One of these lies 2 to 11 miles southwest of Greenville, and the other extends 16 miles southwestward from

Pickens to the southwestern corner of Pickens County. Other deposits are scattered more sparsely through the adjoining part of Oconee County and are known as far west as Richland and Walhalla (fig. 104).

Most of the pegmatite bodies cut across the foliation of the metamorphic country rock. Those in northern Anderson County appear to have been emplaced in fractures that trend north to north-northeast and hence are similar to those in the Hartwell district to the south. Both may well be parts of the same fracture set. The pegmatites in western Oconee and north-central Greenville Counties strike N. 10° to 30° E., and the intervening deposits in Pickens County range in strike from N. 30° W. to N. 35° E. Along the southern edge of the pegmatite belt the strikes swing to northeast and east, and in this respect the dikes are similar to those at the east end of the Hartwell district and in the western part of the Shelby district.

The pegmatites consist chiefly of plagioclase, quartz, perthite, muscovite, and biotite. Garnet, the principal accessory mineral, is abundant in a few deposits. Most of the dikes appear to contain cores of massive quartz, some of which are fringed by books of "A" mica. Some are flanked by perthite-rich intermediate zones. In general the wall zones consist largely of plagioclase, most of which is thoroughly kaolinized where exposed at the surface or in the mine workings. Quartz and muscovite are subordinate constituents.

ECONOMIC ASPECTS OF THE MICA

Mica occurs as flat books in plagioclase-rich pegmatite and as flat-A and wedge-A books along the margins of the cores and locally within microcline-rich intermediate zones. Most of the books are clear and cinnamon brown. Deposits that contain greenish or specked mica are scattered sparsely throughout the area, and stained mica is common a few miles west of Pickens and in the southwestern part of Pickens County. Most of the mica thus far obtained from all the deposits was clay-stained.

In general the books are small, and most are so badly cracked that they yield punch or small-sheet material only. Sound books 6 in. or more in diameter occur in the Cliff Webb deposit, but these are exceptional. Much of the "A" mica is so wedged that it is usable only

as scrap, but flat sheets can be trimmed from the centers of some core-margin books. As a rule the dikes are so thin that the entire thickness of feldspathic pegmatite on each side of the core is mined, and both flat and "A" books are recovered.

Only the Willimon pegmatite is known to have been extensively mined, and few others have been systematically explored. Additional prospecting might disclose minable mica concentrations in many of the deposits. In general they are so similar to the pegmatites of the Shelby and Hartwell districts that the relations in these more fully opened deposits to the northeast and southwest probably can be used as a guide for further prospecting. Thus the feldspathic masses of pegmatite beyond blunt ends of elongate quartz cores and at the flanks of shorter quartz masses should be especially promising as sources of mica. Deposits with discontinuous quartz cores generally contain scattered and small concentrations of mica, and the extent of such concentrations tends to be roughly proportional to the size of the core segments. Both the core-margin parts of the deposits and the adjacent wall-zone pegmatite are worthy of exploration.

DESCRIPTIONS OF DEPOSITS

CHEROKEE COUNTY

One mica deposit in Cherokee County may be mentioned. The Troy Blanton mine, which has been idle for many years, is half a mile from Love Springs and 8 miles west-southwest of Gaffney (location 1, fig. 104). A slumped open-cut 40 ft. long is now only 10 ft. deep. The deposit, which is no longer exposed, apparently is about 30 ft. thick. A little cinnamon-brown mica with greenish streaks is scattered over the dumps. A few books are yellowish olive and contain black specks.

SPARTANBURG COUNTY

COWPENS MINE

A mica mine 2 miles north of Cowpens (location 2, fig. 104) is owned by the Union Central Life Insurance Co. It has been abandoned since 1880, and the open-cut is now 35 ft long, 20 ft wide, and 10 ft deep. No pegmatite is exposed, but blocks of massive quartz on the dump probably were taken from the core of the deposit. Flat-A mica books appear to have occurred along the quartz, and hard, flat, cinnamon-brown books may have been obtained from the surrounding feldspathic wall zone. Some of the mica contains scattered black specks.

WILLIAMS PROSPECTS

The Williams vermiculite prospects are in Cross Anchor Township, south of Cross Anchor and north

of the Enoree River (location 4, fig. 104). They can be reached from Enoree over 5 miles of South Carolina Highway 92, nine-tenths mile of South Carolina Highway 30, and 3 miles of good gravel road that extends eastward. Small, irregular but generally conformable pods and stringers of pegmatite and quartz occur in fine- to medium-grained granitic gneiss and minor interlayered quartz-mica schist. Much of the gneiss contains coarse feldspar metacrysts. The foliation and gneissic layering trend east-northeast and dip south-southeast at gentle to moderate angles. Several pegmatite dikes and quartz veins that appear to have been emplaced along throughgoing fractures strike N. 20° to 30° W. and dip steeply.

Concentrations of vermiculite are exposed in small trenches and gullies in an abandoned road about 350 ft east-southeast of the M. G. Williams residence. A second occurrence is on the south side of the road about 750 ft east-southeast of the house, where the principal vermiculite concentration trends N. 15° to 30° W. and is traceable for a distance of about 150 ft down a south slope. It has been explored by means of a 20-ft pit (now caved), a long, shallow trench 30 ft to the south, and a small pit 80 ft beyond the trench.

The vermiculite in both prospects appears to be concentrated in the wall rock immediately adjacent to a pegmatite dike or zone of pegmatite lenses. Masses of quartz also are present. Three thin pegmatite dikes exposed in a road cut south of the Williams residence are flanked by irregular vermiculite concentrations $\frac{1}{8}$ in. to 6 in. thick. The vermiculite appears to have been derived from biotite. Although none of the larger concentrations are well exposed, their maximum outcrop breadth appears to be about 12 ft. Some of the rock contains 50 to 95 percent vermiculite as flakes $\frac{1}{8}$ in. to 1 in. in diameter. The average diameter is about $\frac{3}{8}$ in. The average vermiculite content of the rocks cannot be determined in advance of further exploration.

OTHER DEPOSITS

The information in the following reports on additional deposits in Spartanburg County was obtained from the Colonial Mica Corporation:

E. W. Foster prospect.—A prospect on the E. W. Foster property, which is near the Little Africa School and 20 miles south of Forest City, N. C., was worked by Dick Shehan and E. L. Walker of that town in 1943.

H. L. Shelton deposit.—A pegmatite body that strikes nearly north is exposed on the H. L. Shelton property, which adjoins South Carolina Highway 101 one mile south of Greer (location 3, fig. 104). It contains some book mica, most of which is stained.

GREENVILLE COUNTY

BOLING MINE

The Boling mine, which is 4 miles south of Greenville (location 10, fig. 104), was worked intermittently over a period of several years by W. O. Boling, the owner, and by others. The openings are partly filled pits in a row about 100 ft long. One of these was cleaned out and deepened to 24 ft during the summer of 1943 by M. C. Snyder and E. B. Saylor, of Rutherford, N. C. The pegmatite dike strikes N. 10° E. In the deepest pit it thins from about 5 ft at the surface to a few inches at a depth of 24 ft. The rock consists chiefly of kaolinized feldspar, with a little quartz and cinnamon-brown mica.

WILLIMON (WILLUM) MINE

The Willimon mica mine, one of the largest in South Carolina, is 9 miles southeast of Greenville (location 11, fig. 104) and can be reached from that town over 3½ miles of U. S. Highway 25 and 0.7 mile of dirt road that extends southeast from Hunter's store. It is owned by W. S. Bradley and was operated extensively during the period 1910–12 by J. E. Burleson, of Spruce Pine, N. C. The old workings, which are in a 600-ft row that trends east-northeast, comprise at least 12 shafts, extensive irregular drifts and stopes, and numerous prospect pits (fig. 113). One shaft is more than 100 ft deep (Sterrett, 1923, p. 287).

The deposit was reopened in 1942, and a little mica was recovered. In March 1944 D. O. Blevins, of Spruce Pine, sank a shaft near the middle of the series of old workings and about 35 ft from the road. Old stopes were penetrated to a depth of 49 ft, and the shaft was abandoned at a depth of 50 ft. The flow of ground water was heavy. The only opening accessible in October 1944 was a 75-ft incline at the southwest end of the mine area. It slopes 24° N. 75° E. and was developed by means of a dragline until older workings were encountered. The other openings are described by Sterrett (1923, pp. 287–288).

The country rock is a deeply weathered mica gneiss that locally is kyanitic. In one exposure the foliation strikes N. 30° E. and dips 45° WNW. The pegmatite body, which probably strikes N. 75° E. and is nearly vertical, is irregular in shape where exposed in the incline. It consists chiefly of kaolin, with massive quartz pods as much as 2 ft thick and a little small muscovite. The pegmatite in the main workings probably is 10 to 15 ft thick and is said to contain a prominent quartz core. Soft yellowish-green "A" mica was mined from weathered feldspathic pegmatite along the south side of this core. Cinnamon-brown mica of good quality is said to occur along the north side and was mined in the

deepest of the old workings. The greenish "A" mica is chiefly scrap, but the brown books are said to have yielded substantial quantities of trimmed sheets. Most of the mica is severely clay-stained.

A 25-ft shaft about 300 ft southeast of the road and due south of the main mine workings exposes weathered mica gneiss and a 300-ft pegmatite body that strikes N. 60° E. and dips 75° NNW. Mica occurs in books 2 to 3 in. in diameter. Another, somewhat thicker pegmatite body was worked in a 30-ft shaft about 170 ft southeast of the road. It strikes N. 60° E. and dips 80° NNW. in decomposed mica-kyanite gneiss. Much small-sheet mica is present in the dump. A 40-ft shaft on the southeast side of the road was sunk in decomposed mica-kyanite gneiss and a thin mass of pegmatite.

OTHER DEPOSITS

The information in the following descriptions of deposits in Greenville County was obtained from the Colonial Mica Corporation:

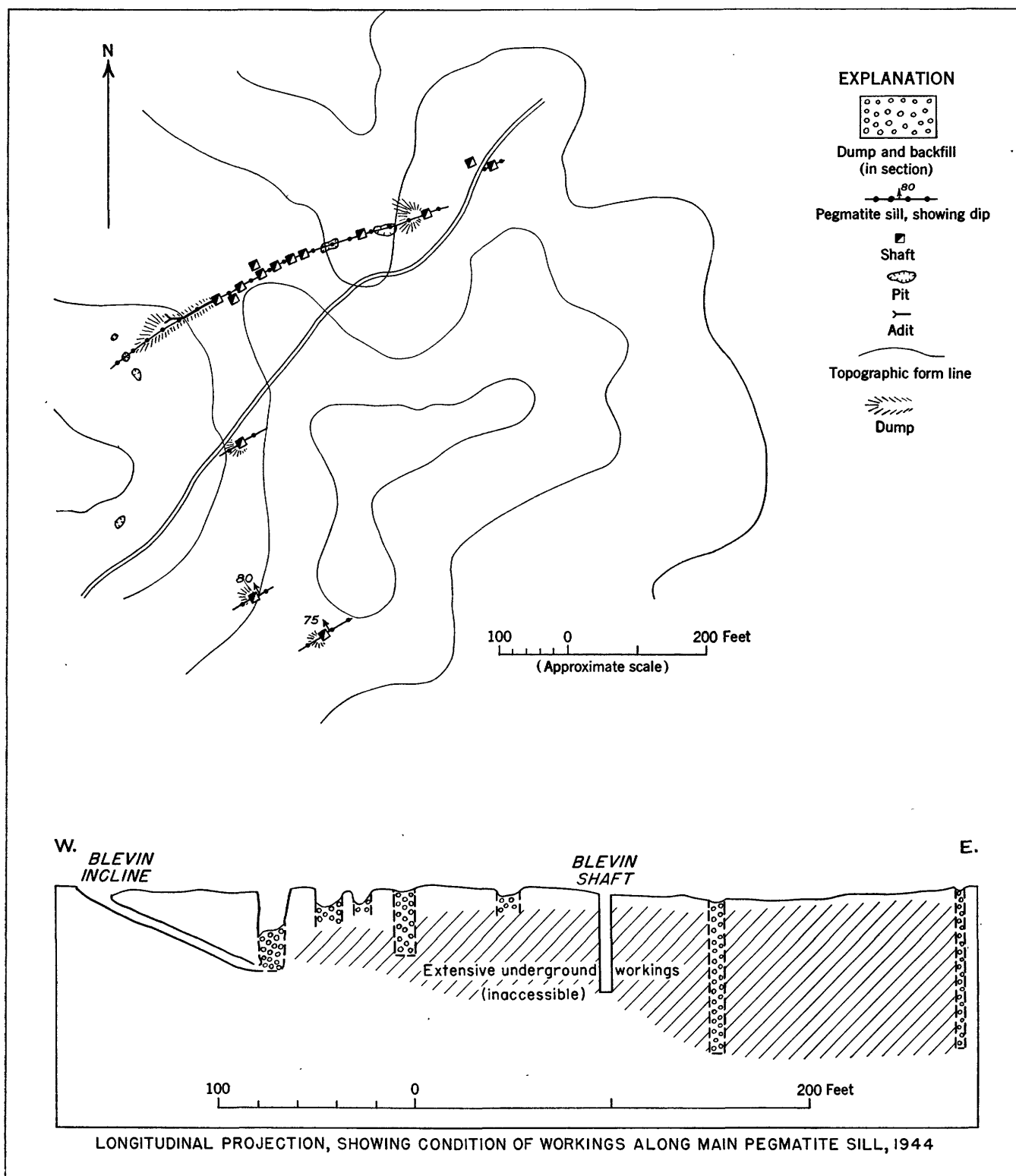
Caesar's Head mine.—The Caesar's Head deposit (location 5, fig. 104), which is owned by the Paris Mountain-Caesar's Head Development Co., is 400 ft west of the road and about halfway up a mountain at the Gap. It was worked during the summer of 1942 by B. J. Sitton, of Hendersonville, N. C. A pegmatite sill strikes nearly due east and dips 30° N. in mica gneiss. It is rich in perthite. Stained books of herringbone mica constitute about 10 percent of the deposit.

L. E. Stringer prospect.—Two shallow pits were dug in mica-bearing pegmatite during 1943 on the L. E. Stringer property, which is one mile from Tigereye School and 11 miles from Greer (location 6, fig. 104).

Barnett and Simmons deposits.—Float fragments of cinnamon-brown mica occur on the C. E. Barnett property, which is about 3.5 miles northwest of U. S. Highway 29 and 6 miles west of Greer (locations 7 and 8, fig. 104). Similar mica float has been noted on the C. H. Simmons property, about 3 miles northwest of U. S. Highway 29 and 6 miles west of Greer.

R. S. Berry prospect.—Small, flat books of badly clay-stained brown mica have been obtained from a deposit on the R. S. Berry property northwest of U. S. Highway 29 at West Gantt (location 9, fig. 104). A 10-ft pit and a 6-ft drift were excavated early in 1943 at a point near a schoolhouse. The pegmatite contains kaolinized plagioclase and relatively unweathered perthite, with subordinate quartz and mica. Although many of the mica books are ruled and cracked, some would yield a little punch mica.

Will Cleveland prospect.—R. B. McNeely sank three pits in 1943 on the Will Cleveland property, 1 mile northwest of U. S. Highway 29 and 3 miles southwest of Gantt. The pits exposed a pegmatite body with a



After Sterrett (1923) Fig 83

FIGURE 113.—Geologic sketch map and section of the Willimon mine, Greenville County, S. C. (after Sterrett and Smith).

quartz core and a wall zone rich in kaolinized feldspar. Flat books of red-brown mica occur in the feldspathic rock. Most are small and clay-stained.

W. F. Holloway and J. J. Brown prospects.—Two prospect pits were dug by W. F. Holloway near a little stream on his property, which adjoins the Will Cleveland land. He also sank a pit on the nearby J. J. Brown property. A little reddish-brown sheet mica was obtained from flat, clay-stained books in both deposits.

Joe Darby deposit.—Small wedge-A (chub-A) books of mica occur on the Joe H. Darby property, which is near Dunklin Church 10 miles northeast of Belton (location 13, fig. 104).

Fred Cox mine.—Good sheet mica is said to have been obtained during World War I on the Fred Cox property, 3 miles southeast of Dunklin Church (location 14, fig. 104). The old openings have been filled, but float mica is abundant on both sides of the road. It is flat, reddish-brown, and clay-stained.

Coke Cooper prospect.—A vertical pegmatite dike that strikes N. 20° E. was opened during the summer of 1943 by Coke Cooper, the owner, 2 miles east of Simpsonville (location 12, fig. 104). A quartz core is flanked by kaolinized feldspathic pegmatite that contains abundant small books of reddish-brown mica.

B. E. Woodson prospect.—An 8-ft prospect pit has been opened on the B. E. Woodson property at Powersville, 7 miles west of Greenville. It was sunk in a pegmatite dike that can be traced for several hundred feet along its strike. Small books of reddish-brown mica are moderately abundant in an aggregate of quartz and kaolinized feldspar that surrounds a quartz core.

PICKENS COUNTY

DAVIS PROSPECT

An open-cut on the Davis tract of the Clemson project area, U. S. Soil Conservation Corps, lies southwest of a small stream which is one mile east of the Seneca River and about 7 miles N. 17° W. of Clemson College (location 23, fig. 104). It trends N. 20° W., and a 20-ft branching drift extends southeast from its southwest end. The deposit is said to have been worked about 1928 by a Mr. Brown. Two parallel pegmatite bodies trend N. 30° W. and dip moderately west-southwest in muscovite gneiss. The country-rock foliation also trends N. 30° W. but dips more steeply. The mica is clear and pale pinkish buff. Most is clay-stained and marked by "A" and herringbone structure, but wedge structure is not common. All the books on the dump are small and cracked, and some are intergrown with quartz.

MORGAN PROSPECT

The Morgan prospect is in the Clemson project area, about 1¼ miles northeast of the Seneca River and nearly 5 miles N. 12° W. of Clemson College (location 26, fig. 104). An open-cut that trends N. 35° E. is 45 ft long, 10 ft wide, and 8 ft deep. As exposed in the southeastern part of the cut, the pegmatite body is at least 10 ft thick, but its attitude is not known. The wall rock is muscovite gneiss that strikes N. 45° E. and dips 45° SE. The pegmatite consists of quartz masses embedded in aggregates of kaolinized feldspar, quartz, and mica. Most of the book mica fringes the quartz mass. It contains wedge-A structure but yields some flat sheets. It is clear, light cinnamon brown, and of good quality, although most books are clay-stained.

MATTIE FALLS DEPOSIT

A pegmatite dike exposed in a road cut about 0.3 mile south of the Morgan prospect is in the Mattie Falls tract of the Clemson project area, U. S. Soil Conservation Corps (location 26, fig. 104). It is about 4 ft thick and contains abundant mica. The books are both clay-stained and mineral-stained, and most are marked by "A" structure. Some would yield small trimmed sheets.

HEAD PROSPECT

The Head deposit is 0.7 mile northwest of Twelve Mile Creek and 4¼ miles north of Clemson College. An open-cut in a field at the top of a hill trends N. 65° E. and is 65 ft long, 5 to 15 ft wide, and not more than 8 ft deep. An inclined shaft is reported to extend in a northeasterly direction to a depth of 40 ft. Two small pits 20 and 30 ft east of the main opening expose the country rock, a purplish, weathered, garnetiferous muscovite gneiss with foliation that strikes N. 80° E. to N. 65° W. and dips 45° to 60° N. to NNE.

The pegmatite dike appears to trend N. 65° E., and is about 4 ft thick in the southeast end of the cut. It consists of quartz, chiefly in irregular masses as much as a foot thick, and subordinate kaolinized feldspar, mica, and garnet. Most of the mica fringes the quartz masses. The books are small, clear, and pale cinnamon brown. Clay staining, ruling, and quartz intergrowths are common, and some of the books are hair-cracked.

ROBINSON PROSPECTS

Several prospect pits that were dug in the Robinson tract of the Clemson project area are 0.6 mile northwest of Twelve Mile Creek and 0.4 mile east of the Head prospect. Flakes of clear, pinkish-buff mica are abundant in the dumps, as well as in the nearby soil.

OTHER DEPOSITS

The information in the following descriptions of additional deposits in Pickens County was obtained from the Colonial Mica Corporation:

C. H. Ellis prospect.—A mica deposit on the C. H. Ellis property, which is west of the Saluda River and half a mile north of the Saluda Dam bridge, was opened in 1943 by R. B. Neeley. Small clay-stained books of pale reddish-brown mica were recovered.

G. F. Fuller deposit.—Mica-bearing pegmatite is exposed in the front yard of the G. F. Fuller residence, which is in southeastern Pickens County half a mile west of Saluda Dam bridge (location 20, fig. 104).

Meece mine.—A little feldspar has been mined on the John R. Meece property at Meece Mill (location 15, fig. 104). The pegmatite, which is only slightly weathered, consists principally of feldspar and quartz, with flat-A and chub-A books of dark-gray mica. Spotted mica is exposed in several nearby prospect openings.

Harvey Harper prospect.—A prospect was opened many years ago on the land of Harvey Harper, which is 5 miles east of Seneca (location 17, fig. 104). It was reopened for a short period during World War II, and small quantities of stained mica were obtained.

Kirksey prospect.—Three 10- to 15-ft pits were dug during 1944 on the property of Mrs. Sadie Craig Kirksey, 5 miles west of Pickens (location 16, fig. 104). Chub-A books of spotted mica occur along the margin of a thick quartz mass that probably is the core of the deposit.

Bolding mine.—A mica deposit on the J. E. Bolding property was worked in 1942 and 1943 and was reopened during the summer of 1944 by H. P. Lammerts, of Shelby, N. C. The workings consist of two open-cuts and several prospect pits. The pegmatite dike, which may strike N. 30° W., contains a thick core of quartz and a wall zone rich in kaolinized feldspar. Many books of pale reddish-brown "A" mica fringe the core, but they yield little sheet material.

McComb prospect.—During 1944 the Bradley Mining Co. explored a mica deposit on the W. T. McComb property, which is near South Carolina Highway 183, at a point 6 miles southwest of Pickens (location 18, fig. 104). The pegmatite body strikes N. 40° E. in mica schist. It is 10 ft wide and at least 150 ft long and contains abundant small books of heavily spotted mica.

John Walker prospect.—A prospect on the John Walker property, 5 miles northwest of Liberty (location 21, fig. 104), was opened in 1944 by C. A. Brandenburg. A mass of weathered feldspathic pegmatite contains small, locky books of pale reddish-brown mica.

Josie McMadden deposit.—A pegmatite dike on the Josie McMadden property (location 22, fig. 104) strikes nearly due east and contains scattered small books of pale reddish-brown mica.

Murphrie deposit.—A quartz-rich pegmatite body on the N. E. Murphrie farm, 1 mile northwest of Norris (location 24, fig. 104), contains large "A" books of spotted greenish mica. The deposit trends N. 10° W.

Ross Morgan prospect.—Two pits were dug in 1944 by Ross Morgan on his father's property, which is 5 miles north of Calhoun at the junction of South Carolina Highways 133 and 139 (location 25, fig. 104). The deposit contains flat-A books of pale reddish-brown mica.

OCONEE COUNTY

Several mica deposits in Oconee County are worthy of mention:

Leroy prospects.—Several mica deposits have been prospected on the G. W. Leroy property, 5 miles northeast of Seneca (location 30, fig. 104). Small quantities of clear, reddish-brown mica were obtained from shallow cuts and pits. The main pegmatite body contains a quartz core that is fringed by flat-A mica books. Most yield little sheet material. Other mica prospects are on the John Dyer property, half a mile south of the Leroy deposits, and on the J. B. Smith property, a quarter of a mile farther south.

Bruce Doyle and Reedy Burns deposits.—A large mass of quartz crops out on Federal land on the northeast side of U. S. Highway 76 northwest of Long Creek near the Georgia State line (location 28, fig. 104). Clay-stained mica occurs in the nearby soil. Some prospecting was done by Bruce Doyle.

The Reedy Burns deposit is on the southwest side of U. S. Highway 76 near the Georgia State line. The pegmatite body trends northeast in mica gneiss and can be traced for a distance of 60 ft. It is fairly hard and unweathered and contains books of "A" mica. Little sheet material could be recovered from the books. A large mass of quartz exposed near the adjacent creek trends N. 15° E.

Keith deposit.—Flat-A books of lightly specked, pale reddish-brown mica occur in pegmatite on the Thomas R. Keith property 7 miles north of Seneca (location 29, fig. 104).

Parker deposit.—Float fragments of pale reddish-brown mica occur on the property of A. J. Parker, near the Lonsdale School at Lonsdale Mills.

Amos L. Honeycutt deposit.—Mica is known to occur on the Amos L. Honeycutt property half a mile southeast of Clemson College.

ANDERSON COUNTY

BURGESS (L. E. HUNTER) MINE

The Burgess deposit is near a dam on Twenty-Six Mile Creek, about 9 miles north of Anderson (location 32, fig. 104). It is said to have been discovered about 1889 by Bill Swayingim. The mine was operated during the fall of 1943 by F. E. Snow, of Franklin, N. C., and about 500 lbs of book mica was taken from a hole about 6 ft deep. L. E. Hunter reopened the mine during the spring of 1944 and enlarged the cut to a length of 29 ft and depths of 8 to 14 ft.

The country rock is a massive-to-well-foliated feldspathic quartz-biotite gneiss that contains a little garnet. Flakes of muscovite as much as a quarter of an inch in diameter are common along the pegmatite contacts. In some places the gneiss between closely spaced pegmatite lenses has been altered to coarse muscovite-biotite schist. The trend of the foliation ranges from N. 15° E. at the north end of the cut to N. 63° W. in the middle, and the dip is 20° ESE. to NNE.

The cut exposes two vertical pegmatite bodies that strike N. 27° E. The eastern dike is 1 to 1½ ft thick and contains several septa of gneiss. It may thicken southwest of the cut, but it fingers out to the northeast. In the north end of the cut its projected position is reported to be occupied by a series of concordant, nearly flat lying lenses 6 to 12 in. thick arranged one above the other. Individual lenses are elongated parallel to the strike of the deposit and plunge north at angles of 5° to 20°. The west pegmatite is exposed in the northwest corner of the cut, where it comprises a vertical pile, or group, of lenses similar to those in the northeast part of the east pegmatite.

The principal minerals of the deposit are quartz, feldspar, muscovite, and biotite. Most of the feldspar grains are ¼ to 1 in. in diameter. They appear to be plagioclase that is only slightly weathered. Biotite is present as thin black blades as much as an inch long, as well as in flakes less than ½ in. in diameter. Muscovite-bearing quartz-rich pegmatite occurs along the walls of the bodies.

The thickest layers of quartzose pegmatite and the largest muscovite books are exposed in the east dike near the south end of the cut. Biotite is scattered through the adjacent feldspathic rock but is not closely associated with the muscovite. The muscovite is pinkish buff, but a few books are light yellowish olive and some contain greenish centers with reddish rims. No mineral stain was observed, and clay stains are not widespread. The books in the dumps are less than 4 in. in diameter. Many are lumpy, and about a fifth of them are reeved. Most of the trimmed sheets recovered during the mining operations are said to have been small.

OTHER DEPOSITS

The information in the following descriptions of additional deposits in Anderson County was obtained from the Colonial Mica Corporation:

McMurtley deposit.—Float fragments of pale reddish brown mica occur on the land of Mrs. Rosa McMurtley near U. S. Highway 178 and 10 miles northwest of the Anderson city limits (location 33, fig. 104).

D. J. Tucker deposit.—Small float fragments of stained mica occur on the D. J. Tucker property, which is 2 miles northwest of U. S. Highway 29 and 4½ miles southwest of Williamston (location 34, fig. 104).

Patton mine.—Two pegmatite dikes were exposed 4 miles northeast of Belton in a ditch dug for a gasoline pipeline (location 37, fig. 104). During August 1944 L. L. Heaton sank seven pits and drove a 25-ft drift to locate and explore the deposit. The dikes strike N. 55° E. and dip northwest. Mica is not abundant, and all the books are very small. They are light reddish brown. A large mass of quartz that is exposed nearby trends N. 85° E. and may be the core of a third dike.

Cliff Webb prospect.—A pegmatite body that strikes nearly due east can be traced for a distance of several hundred feet on the Cliff Webb property, which is about a quarter of a mile southeast of U. S. Highway 29 and 9 miles southwest of Williamston (location 36, fig. 104). Many large books of clear, light cinnamon-brown mica are exposed in an 8-ft pit. Some would yield 3-by-5-in. trimmed sheets. Additional prospecting might well be warranted.

J. A. Jones prospect.—A prospect on the property of J. A. Jones, Jr., 1 mile south of the Hollad store, was opened by J. A. Jones, Sr., in 1914 and was reopened in 1943 by J. C. Jones. The pegmatite dike is enclosed in mica gneiss that strikes N. 60° E. and dips 40° NNW. It contains books of heavily stained mica, from which a few clear sheets can be recovered by careful rifting.

The data on the Welborn and McConnell prospects were obtained from D. B. Sterrett (1923).

Welborn prospect.—A 10-ft. prospect pit was sunk about 1905 on the land of W. C. Welborn, 6 miles east-southeast of Belton (location 38, fig. 104). It was filled after small quantities of rather heavily specked mica were obtained. The country rock is thoroughly weathered mica gneiss that strikes N. 60° E. and dips 65° SSE. Small stringers of pegmatite exposed in the roadside are nearly normal to the gneissic structure. Blocks of white quartz were left on the surface in the vicinity of the pit, and scrap mica is very abundant in the nearby soil. The pegmatite is said to be mica-rich. Some of the books contain "A" structure, but their flat

portions would yield good sheets. A few rough sheets 8 in. in diameter have been seen.

McConnell prospect.—A prospect opened about 1895 on the J. N. S. McConnell property, $3\frac{1}{4}$ miles north of Anderson (location 35, fig. 104), yielded flat books of mica and beryl crystals of good color. Some of the beryl is said to have approached emerald in color and clarity. The principal workings include a trench 45 ft. long, 15 ft. wide, and 5 ft. deep and a connecting crosscut trench at its west end. The main trench trends N. 70° E. The country rock, which is thoroughly weathered, probably is biotite or hornblende granite with small masses of diorite. No pegmatite is exposed, but the dumps contain kaolinized feldspar, blocks of massive white quartz, smoky and colorless quartz in rough crystals, weathered plates of mica as much as 8 in. in diameter, large dark-red crystals of garnet, black tourmaline, limonite pseudomorphs after pyrite, and

black stains of manganese oxide. Much of the mica is clear, pale reddish brown, and of good quality.

Other pegmatites on a nearby ridge that trends N. 15° W. have been tested by pits for a distance of 75 yd. Most of the openings are partly filled, but their maximum depth probably was not more than 15 ft. The country rock is mica gneiss, but its relations to the pegmatite cannot be determined. The deposit is at least 20 ft thick and contains veinlike masses of white quartz. Large crystals of mica are said to have been mined, but only fragments remain near the workings. The mica is clear, light brown, and of good quality.

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